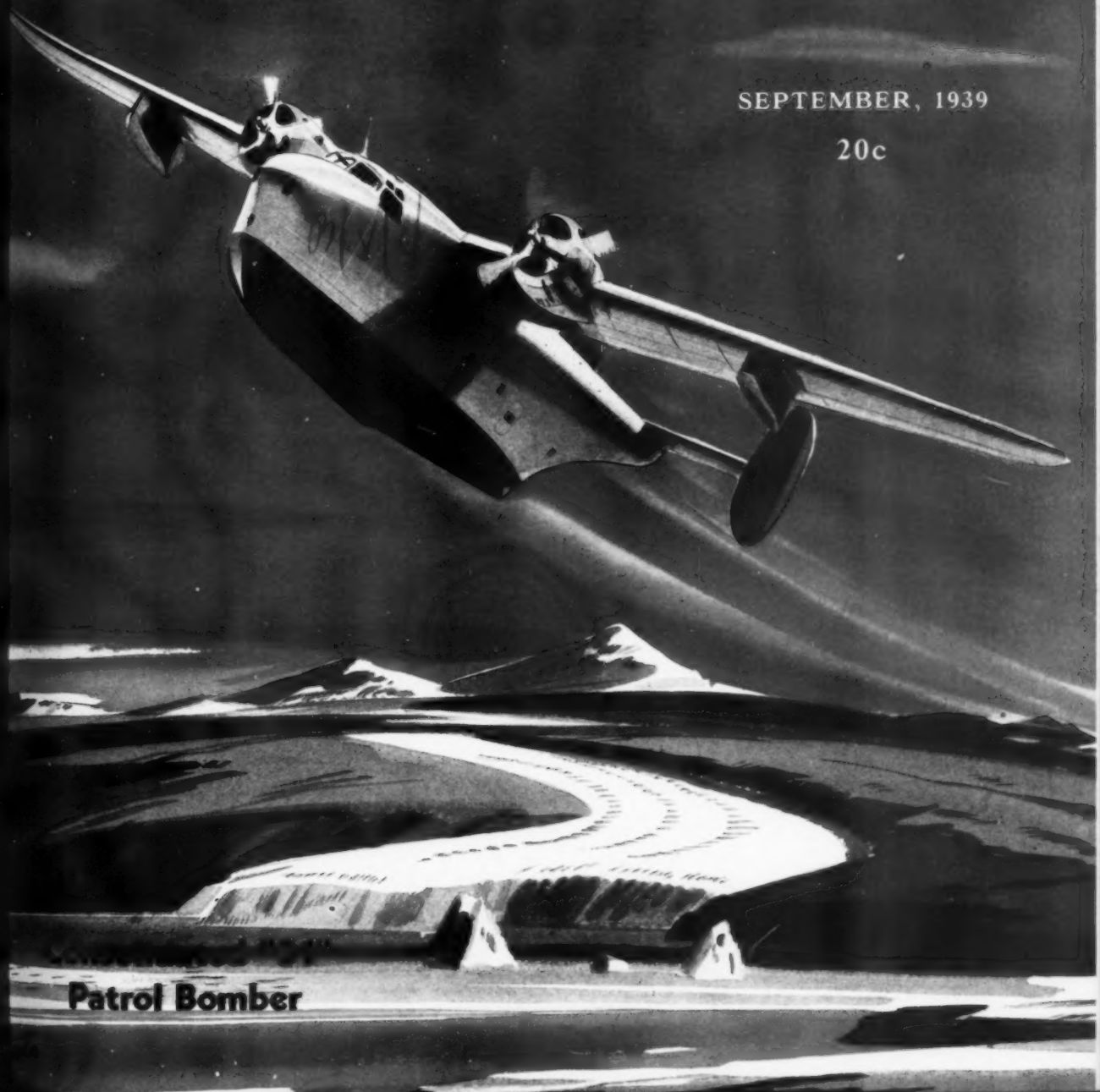


# MODEL AIRPLANE NEWS

*11th Year of Publication*

SEPTEMBER, 1939

20c



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- No. 110 Boeing P26
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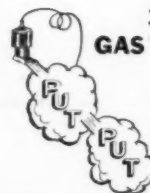
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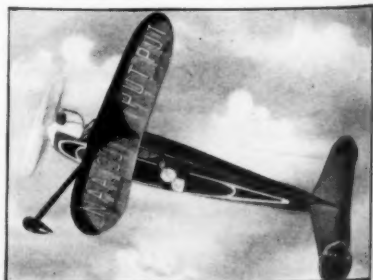
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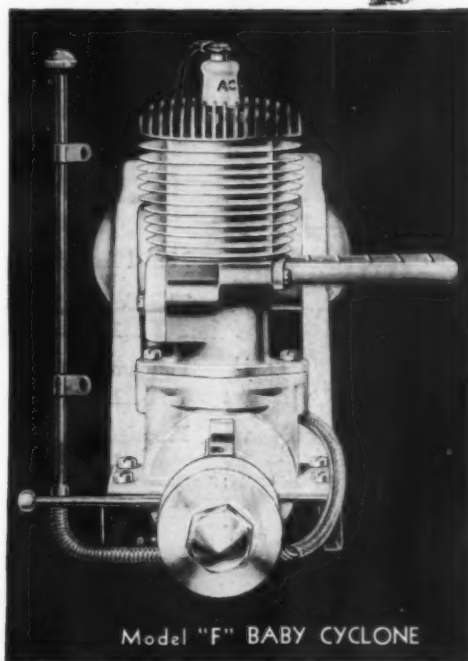
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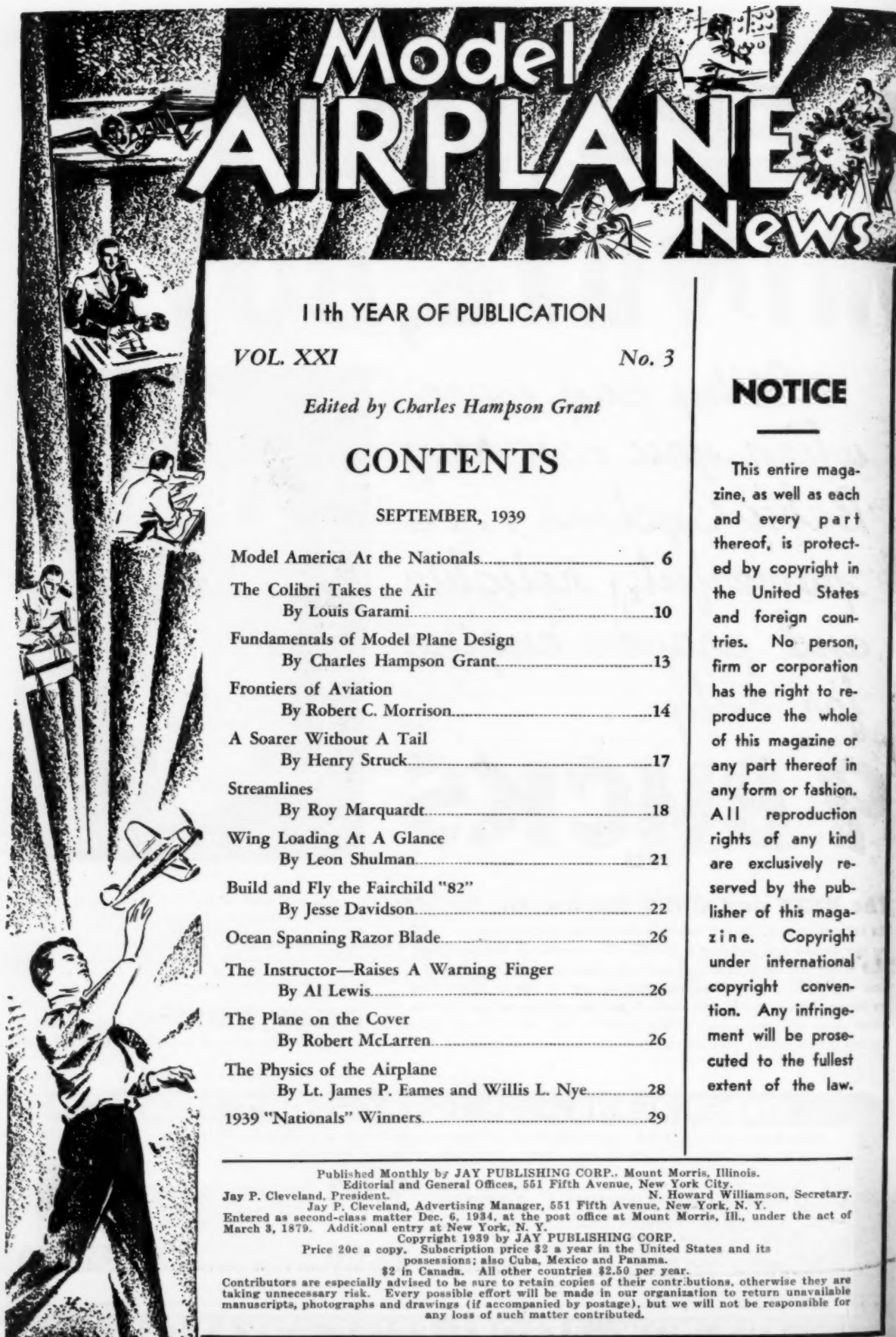
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# Model AIRPLANE News

11th YEAR OF PUBLICATION

VOL. XXI

No. 3

*Edited by Charles Hampson Grant*

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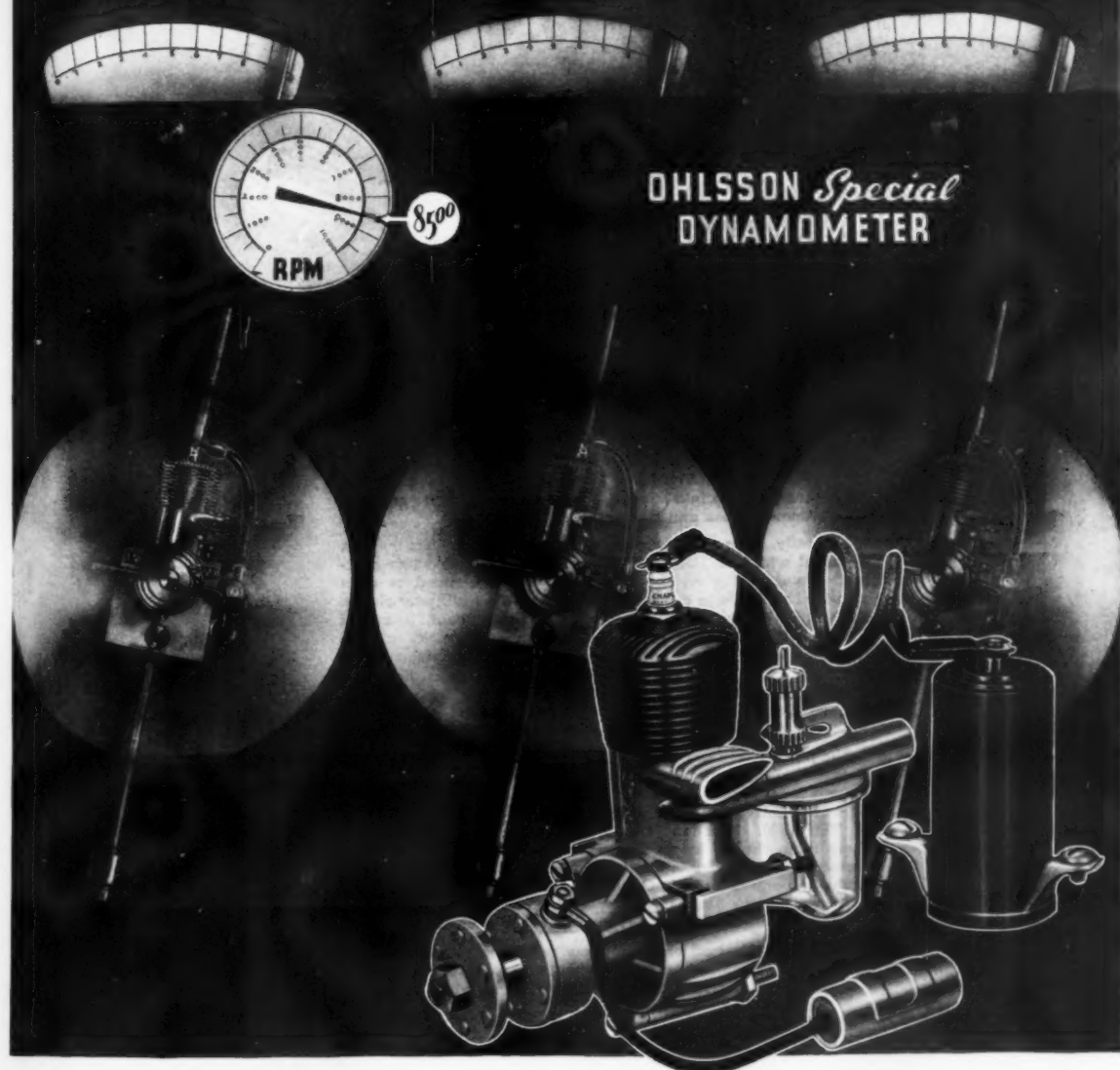
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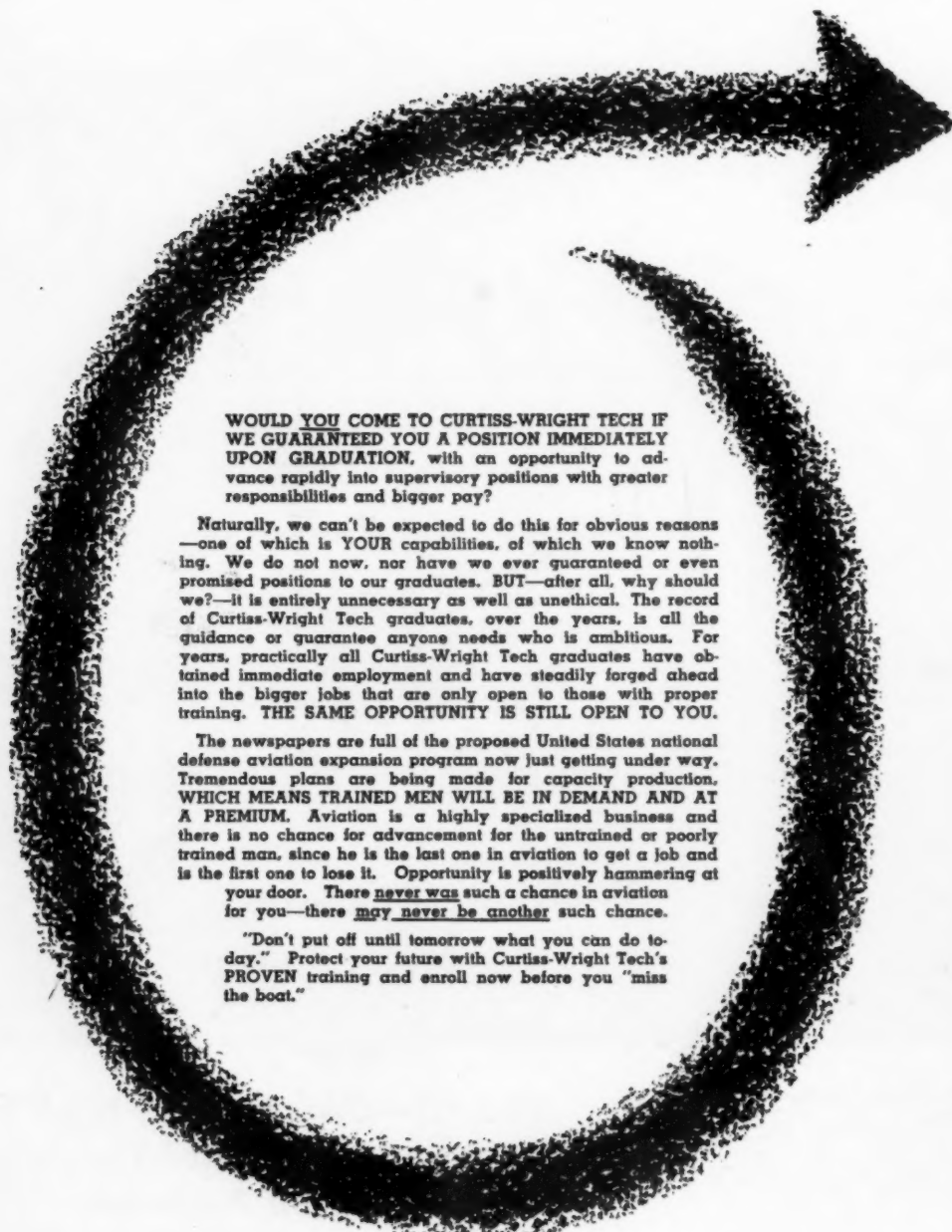
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Please note address of new Ohlsson plant

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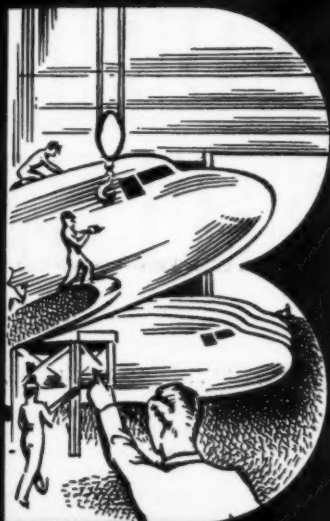
Naturally, we can't be expected to do this for obvious reasons—one of which is YOUR capabilities, of which we know nothing. We do not now, nor have we ever guaranteed or even promised positions to our graduates. BUT—after all, why should we?—It is entirely unnecessary as well as unethical. The record of Curtiss-Wright Tech graduates, over the years, is all the guidance or guarantee anyone needs who is ambitious. For years, practically all Curtiss-Wright Tech graduates have obtained immediate employment and have steadily forged ahead into the bigger jobs that are only open to those with proper training. THE SAME OPPORTUNITY IS STILL OPEN TO YOU.

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The opening ceremonies at the field, led by Irwin Polk



Andrew Peterson's plane makes a snappy take-off



The indoor contest in full swing at the Grosse Ile Airship Dock

# ★ ★ ★ ★ ★ MODEL AMERICA ★ ★ ★ ★ ★

THE dizzy whirl of events and sleepless nights of the 1939 National Model Plane Contest, held at Detroit, Mich., July 5th to 9th, have now passed into the realm of history. Those who attended the affair retained the impression of a kaleidoscope of successive incidents reoccurring in quick succession, with

which their senses never quite caught up.

Eleven hundred boys, four days of going to the field in the morning, preparing planes under a blazing sun, waiting for timers, arguing about cross sections and area, rushing home at the end of the day—are highlights of the activities. Of course we must not forget the hours spent under the electric lights till the wee hours of the morning,



The Akron, Ohio, group wait for the airport bus



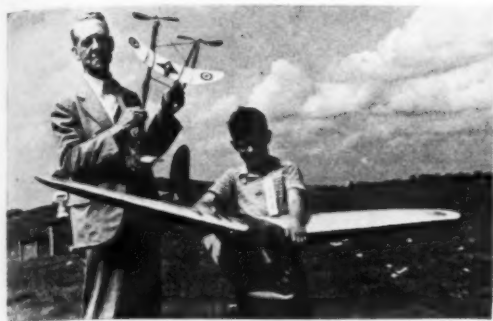
Preparing a fuselage job for flight at the "indoors"



Contestants listen to a pep talk—all but one (arrow)



Contest Director, Art Vhay, gives last minute advice



A model builder of the "early days" and one of 1939



Berryloid Winners; Joe Raspanti, C. Siegfried and Mike Roll

N.A.A.—Gas Lines—Air Ways

# At The Nationals

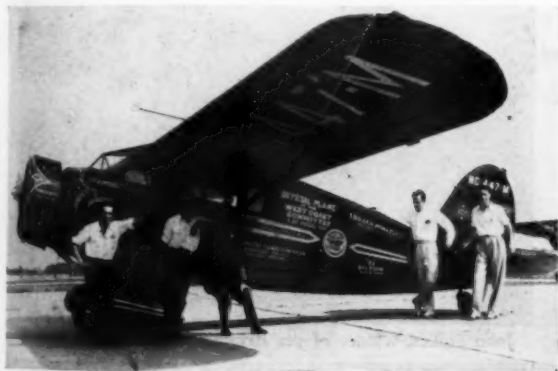
repairing crack-ups and getting ships ready for the next day's events, and the ominous warnings of "The Wasp," twin brother to the "Green Hornet."

One undergoes all of these with great patience when he considers the compensation of meeting old friends and discussing the technique of model designing, building and flying by the experts. The Nationals

is the annual classic which, in effect, is one round of activity from the opening day to the closing banquet. After that the contestants stagger homeward with a glazed look in their eyes and a lean look to their pocketbooks. To dwell in detail upon the many interesting happenings at the contest would be



Contestants with models leave the hotel elevator en route for the flying field



West Coast fans; Knapton, Christenson, Rice and Ohlsson fly to the meet in this Stinson



The workroom in the Fort Shelby garage is a busy place



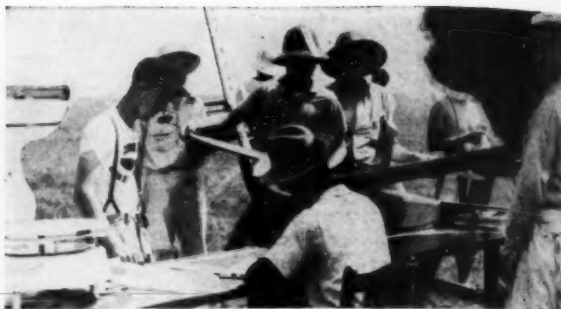
House of the Youngstown boys for the duration of the meet



The Chicago Park District group watch test flights



The Berkley Flying Club listens to wise words of Joe Raspanti



Contestants weigh in before the (fight) flight



Henry Thomas Jr., Nat. Champ and Exchange Trophy



Charles H. Grant presents MODEL AIRPLANE NEWS Trophy to Bud McClellan

to gild the lily—in view of the pictures which we present here for your enlightenment. However a brief summary will not be out of place; this will enable our readers to coordinate the many individual incidents represented by the accompanying pictures.

On Tuesday the Fort Shelby Hotel, meet headquarters, suddenly broke from its leisurely routine into a cyclone of milling model builders, officials, sponsors, wives and friends from all parts of the country. Boxes, crates and packages containing models of all kinds poured into the hotel in a continuous stream. The registration office did a rushing business recording the contestants' names, addresses, etc., under the various events in which they were to participate: Stenographers and recorders were arm-weary.

As the contestants completed this first consideration they turned to the display room, in which many of the model dealers presented their products in grand array. One of the outstanding ex-



Ray Rouch, Garwood Trophy winner, and E. Barrow Jr., 2nd place



John Stokes, winner of the Bloomingdale Indoor Trophy



Class A winners; John Findra, Leo Shulman and Art Block

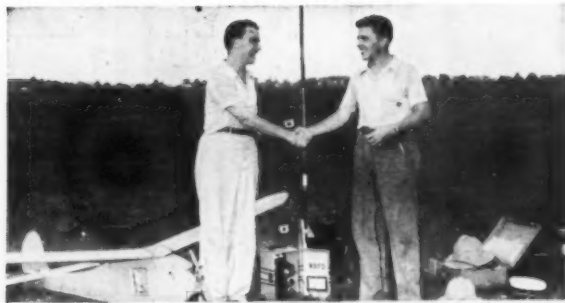


Stout Trophy winners; Bob Toft, Dick Everett and Ed Naudzius





Raspanti guides the take-off of his radio job. Taibi keeps pace



Good Brothers congratulate each other on their winning radio controlled flight

hibits was a new, opposed, twin gas engine which developed up to 1/2 horsepower. The shining colors of the MODEL AIRPLANE NEWS display, vibrating from an array of cover pictures that decorated one end of the room, lent character to the scene. No events were scheduled for Tuesday; this was the day for getting together and meeting old friends.

On Wednesday the opening exercises at the field started the ball rolling. Eleven hundred contestants descended upon the seventy timers, with little sympathy for the job that the latter had to perform. As the day wore on contestants gradually proceeded from the testing and adjusting stage of the competition to the undertaking of official flights. The Outdoor Cabin Event occupied most of their attention, together with the Eliminations for the Moffett International Event.

The second day was more or less a repetition of the first, except that the heat was more intense

(Continued on page 29)



Ed Roberts presents Radio Control Trophy to Walter and Bill Good



Korda, winner of the Wakefield Eliminations Trophy



The Flying Scale winners, except Thomas, with their planes



Indoor winners, Bill Stokes and Stanley Stanwick



Wheat Trophy Winners; Krebbiel, Velkoff, Wright, Lorenzen



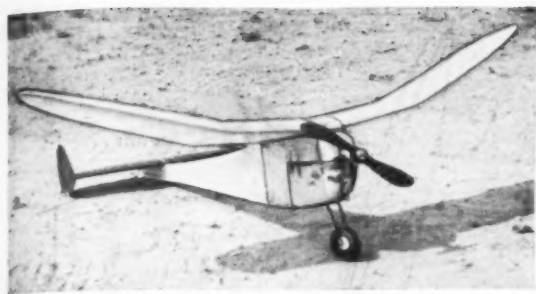
Wakefield Team; Korda, Cahill, Chaille, Baker and Bohash



# The Colibri Takes The Air

How You Can Build and Fly a Gas Model of the Smallest Class That Weighs Only 12½ Oz. and Climbs Like a Rocket

By LOUIS GARAMI



A one wheeler but it stands alone. Note how the power plant weights are concentrated at the center of lift

SINCE the new 1939 gas model rules took effect, the poorest performance has been shown by the Class A group models.

The main reason for this is the 225 square inch maximum wing area limit which forces the builder to produce either a super-weak or a too heavy job for this class. Engine inefficiency and comparatively high wing loading, spells a poor climb and a steep glide. No wonder that the past contests were won by models averaging less than 60 seconds!

Naturally the rule is very young and builders did not have time to get around it like they always do sooner or later, but it will be a tough job to boost the performance figures where they really ought to be.

Here we have a model which tips the beam at 12 1/2 ounces and has a wing area of 225 square inches without being weak, and it is not a skeleton of an airplane either. Why, it even has an airwheel on it; but only one. We could not afford another one at 1/2 ounce a throw.

You might think that we mentioned this fact just for the fun of it; but when you consider that any reliable power plant with timer weighs over 8 ounces, it is easily seen that the model itself should not weigh over 4 ounces, which is less than a good rubber powered model of the same size.

In our model you will get a lot for your 4 ounces. A cowled-in engine, removable power plant, remote control choker and other practical improvements are all there to induce you to dust off the old Class A engine and take a crack at that 60 second record.

## Body

Enlarge the drawing of the body sides onto a piece of cardboard or wrapping paper. For the longerons, use soft even-grained balsa. Make both sides together, one on top of the other. The top longeron goes all the way to the front of the body but since at the trailing edge of the wing the bend is sort of abrupt, better splice on a separate piece instead of trying to bend it. Do not forget to put all the diagonals in place. They are very important. Couple the two sides together with cross braces making sure that the body is in square and fill in the front with 1/8" sheet balsa. When finished it has an "Andy Gumpish" appearance, since the engine assembly is fully removable.

The engine housing is carved and hollowed out of two soft balsa blocks, each

measuring 1 1/4"

x 4 1/2" x 3". First they are glued together lightly and carved to shape outside to fit the body allowing for the thickness of the felt which lines both the body and the engine housing. The cross section of this part is square, with the bottom corner rounded off more and more toward the front.

We have used the Bantam engine in our model, but because Class A engines are more or less alike in size and shape, the size of the housing should be big enough for any of them.

Hollow out the housing to about 3/16" thickness except in the front where the thickness should be guided by the size of the engine cylinder. Mount the engine onto two short hardwood beams and cut two ledges in the balsa so that the beams will be sunk flush with the top of the housing.



Here it is in full flight, coming in on the glide. It is NOT suspended by wires

Now cement two hardwood pieces to the outside of the housing corresponding with the beams on the inside. Four wood screws will hold the engine firmly in place and at the same time in case the beams get oil soaked they can be replaced easily.

The rest of the ignition parts are laid out according to the wiring diagram shown on the plan. Make sure that the coil, which is the heaviest of the parts, is mounted in the very end of the housing. This is important to balance the model perfectly.

Coat the housing with light cement in-

side and out, otherwise the oil and gas will ruin it in no time.

The landing gear is bent out of 1/16" steel wire. It is cemented firmly on the inside of the housing and is protected by two large brass washers on the outside. The struts can be pried apart and the light air-wheel set in place. In case of a hard landing, this type of strut proves very practical. Since very light wheels are in need of repair quite often, their being easily removable is a distinct advantage.

To keep the housing from shifting, 1/16" wire and large bushings to fit are cemented on the side of the housing and the body respectively. Besides, there are four wire hooks on each with rubber bands holding the housing firmly to the body.

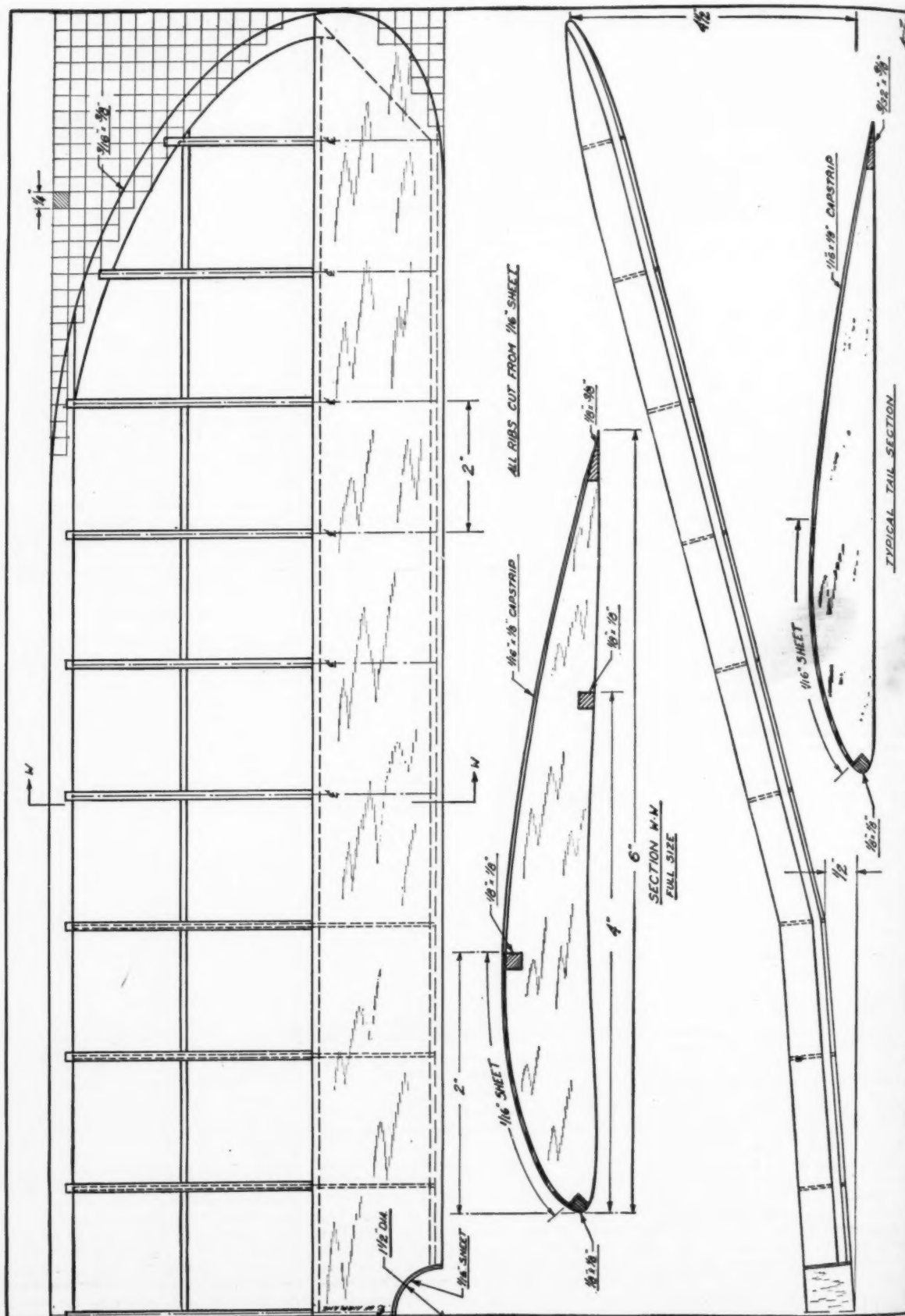
## Wing and Tail

The wing is made in two halves. There is no flat center section which prevents the wing from rocking. Cut all the ribs out of soft 1/16" stock. In fact to be able to reproduce a wing of the original weight every piece of wood used has to be of the light variety. The center ribs are tilted slightly to reach a dihedral of 1/2" at the fourth rib. For the tip dihedral you have to crack every spar first and then cut a 3/32" piece out of the top spar. Recement all spars firmly. The sheet balsa covering is in four sections. First always cement and pin to the top spar then bend down to the leading edge. Trim at the leading edge. Cap strip all ribs and sandpaper the whole framework carefully. The half circle cut out at the center is for the needle valve. On some of the motors this is not needed or its size can be reduced greatly. In fact our practice shows that the best way is to push the wing back an inch or so while revving up the motor and when it is all set just push it into place.

The stabilizer is constructed in a similar way as the wing, except for the lack of spars. Make sure that the end ribs are perpendicular. Sandpaper the sheet balsa rudders into a streamlined section and cover with tissue paper before attaching to the elevator. Cover the body with silk if you want to have a lasting job. Brush dope on the framework and put the silk on wet pulling it as smooth as you can. When it dries it tightens up beautifully. Cover the bottom of the wing with double tissue. Protect the wing trailing edge from chipping under the strain of the rubber

(Continued on page 47)





BY  
**CHARLES  
HAMPSON  
GRANT**

## Chapter No. 1—Article No. 2

THE basic factors that an airplane must embody in order to lift from the ground, fly from one spot to another and land without damage, are as follows:

1. A Means of Lift.
2. A Means of Propulsion.
3. A Source of Power.
4. Stability.
5. A Means of Landing.
6. Connecting Structure.

If any mechanism embodies all these factors in correct relative proportion and to a sufficient degree, then it possesses all the qualities required to operate it as a successful flying device.

However this is not sufficient if it is to serve some useful purpose. It must possess more than the capacity to merely fly. It must be controllable to some degree at least; otherwise it would be impossible to direct its flight or cause it to execute any

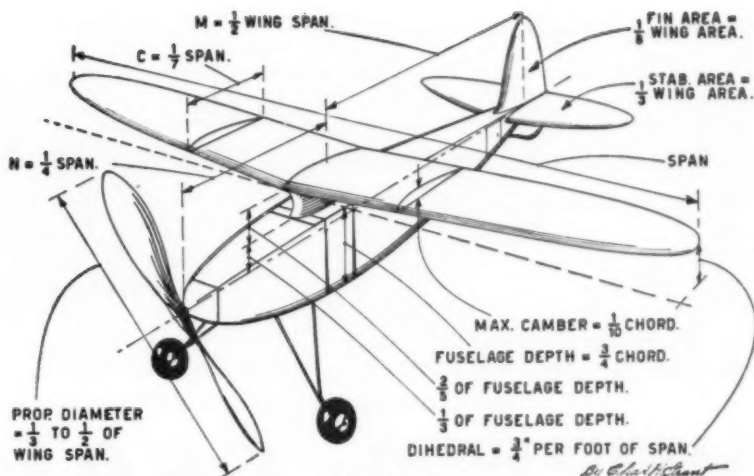


Fig. No. 2

# Fundamentals of Model Plane Design

## Principal Structural Units of an Airplane That Act to Fulfill the Requirements of Flight—How Lift is Generated

predetermined maneuver. In other words, it must embody the quality of **CONTROLLABILITY**.

Of course the satisfactory expression of this characteristic by the plane depends to a certain extent upon the knowledge and ability of the flier or pilot to direct the course of the craft. In the case of a full scale airplane the pilot maneuvers or directs it by moving the control surfaces through the operation of control mechanism.

There are no movable control surfaces on most model planes! All their surfaces are set in a fixed position during the course of any flight. If the model pilot wishes to have control surfaces operate to change its normal course of flight while it is in the air, then

some automatic mechanical device must be incorporated in the plane to move them as desired. Obviously a human pilot cannot be on board the model ship to guide it.

The control of the average model originates from the fact that its surfaces may be set in such relative positions and attitudes that the intensity of the power and action of gravity at any moment cause the plane to act in a precise manner.

Thus the model flier, to a certain extent, may cause the plane to fly in a predetermined manner and direction. He cannot control the wind direction or air currents, but these may be taken into account and allowances made for them.

(Continued on page 62)

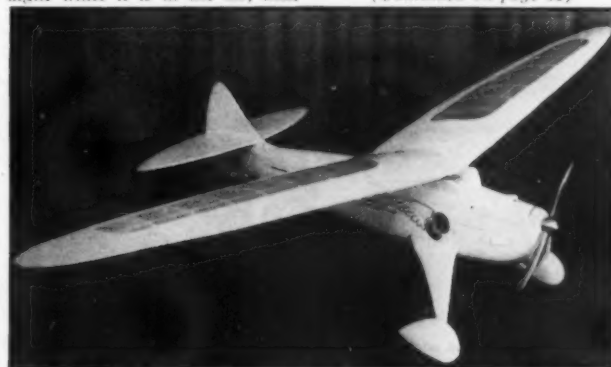


Fig. 1. A typical well proportioned gas powered model plane

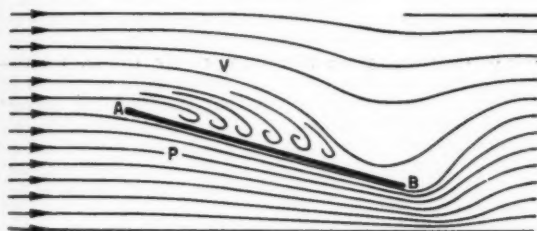


Fig. No. 3

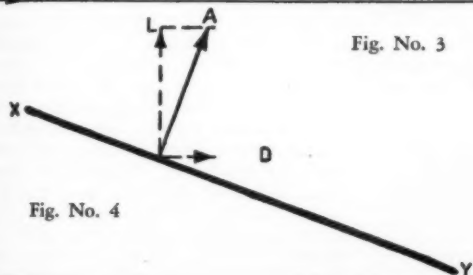


Fig. No. 4

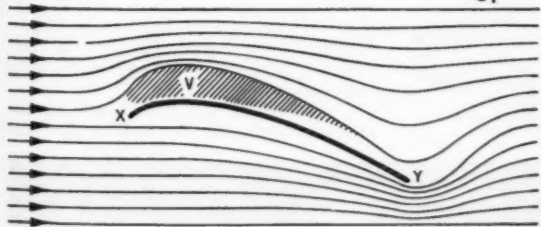


Fig. No. 5

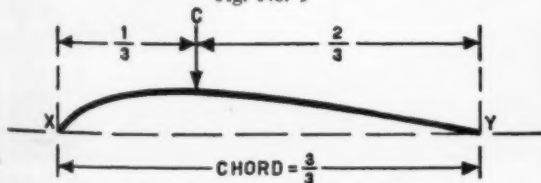


Fig. No. 6

Copyright By Charles Hampson Grant.



The Consolidated trans-Atlantic survey plane above the clouds. (Morrison)

By **ROBERT C. MORRISON**

# FRONTIERS

ENGLAND'S favorite airplane is the mighty little Bristol "Blenheim." It is one of the fastest twin-engined military ships on all Europe, and with a goodly store of bombs housed in its belly it is one of England's most potential air weapons. Though we could never understand why the English went to all the trouble of building

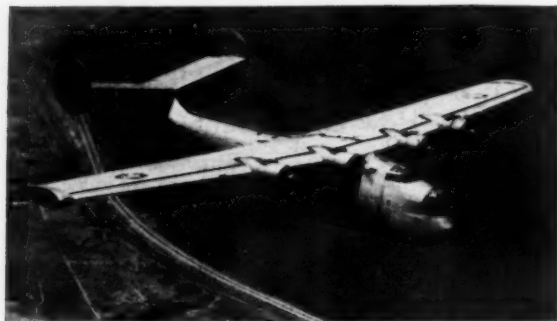
some of those "airplanes" they now have, such as the Avro Anson, we must break down and admit that we like the Bristol "Blenheim" very much. It is the type of airplane that would fit well into our attack-bomber class.

Now Bristol presents a new twin-engined, mid-wing airplane, one of the first of the new designs that we have been waiting for from England. It is of the same general appearance as the "Blenheim"—the same tail design and wing plan form. Known as the Bristol "Beaufort," it is designed as a reconnaissance torpedo bomber and as such necessitates a slightly

larger airplane than the "Blenheim." The powerplant consists of two of Bristol's new Taurus sleeve-valve engines that develop about 1,000 hp. at take-off. They are of small diameter and because of the increased size of the ship the engines are not as prominent as they are on the "Blenheim." The pilot perhaps does not feel so snug as when between the larger engines that sheltered him from enemy bullets, but the "Beaufort" has added speed to pull away from its pursuers. As usual the exhaust manifold is in the leading edge of the engine cowl and cooling flaps are installed. Three-bladed propellers are used with the thrust line just below the chord line of the wing.

The fuselage differs from the "Blenheim" in that at the mid-ship's point the contour of the top drops abruptly for the installation of a gun turret. This break in contour perhaps does not slow the plane many miles an hour, but on the planes to come where designers say they will get speeds up around 300 and 400 m.p.h. any such feature would be prohibitive. The English appear to be having trouble with their rear gun turrets because of lack of elbow room, necessitating large cumbersome glass enclosures. Even the clean lines of the Lockheed "Hudsons" going to England are marred by the ugly looking rear gun turret. However there is now a "Hudson" in England with a retracting turret that may solve the problem.

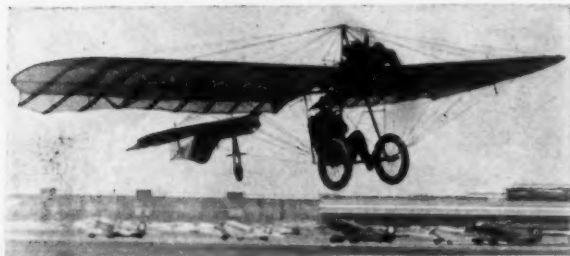
The speed of the "Beaufort" has not been disclosed. But we wonder that with



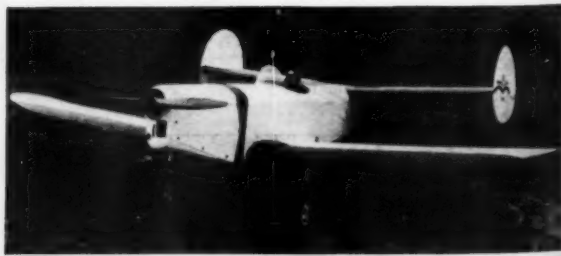
The new Consolidated XPB2Y-1 patrol bomber. A fleet of these are being built for "the Navy."



The Italian Savoia Marchetti S-79 three engine racer. It has a speed of 281 m.p.h. and is equipped with slots and flaps (Bulban)



Hans Grade flies the same plane on his 60th birthday that he flew in 1909. It is the same in principle as the planes of today. The construction is the only factor that is different (Internat'l)



The Civil Aeronautics Authority prohibits planes with lifting stabilizers. Model plane designers have proved they give greater stability. This 40 h.p. Mauboussin upholds their contention.





Ted Bellak, an old model builder, takes off on his record flight across Lake Erie (Acme)

## OF AVIATION

the very high speed that the airplane must attain together with that added by C. G. Grey, editor of "The Aeroplane," the torpedo bomber will be able to dodge the onslaught of those Heinkels and Messerschmitts that are reported to be getting closer and closer to the 500 m.p.h. mark; and if the "Beaufort" is to do any fighting in the near future it will be against those famous German airplanes.

There are no wing fillets except for a slight fairing at the trailing edge. It was startling news when Jack Northrop introduced the wing fillet on his Gamma model many years ago and then the wing fillet was seen on all airplanes from then on until Lockheed came along with their Electra. Fillets were originally designed for this airplane, but then Lockheed surprised everyone by discarding them. Now it is news when a company does not use wing fillets. That has been the way with aircraft design from the start. Wing flaps have come and gone and then reappeared, the nose wheel is on one month and off the next, and even now designers are thinking about bringing the tail first idea into existence for the nth time.

Another of John Bull's new fighters is the Martin-Baker single-seater which again brings many features that were thrown out a few years ago . . . but here they are, all back again as big as life. About the nearest thing to the Martin-Baker in this country was

the "Delgado Maid" that did a nice bit of taxiing at the National Air Races a couple of years ago. It probably is not fair though to compare this new Martin-Baker with the Delgado racer for it  
(Continued on page 36)



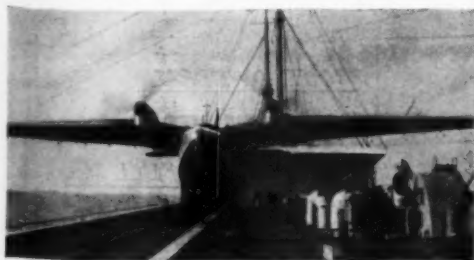
Ted Bellak receives the pouch of mail carried on his flight



One of the Consolidated patrol bombers recently ordered by the U.S. Navy (Internat'l)



A fleet of Handley Page bombers ready to take off for maneuvers in England (Globe)



The trans-Atlantic Dornier Do. 26 about to be catapulted from its mother ship (Monkemeyer)



230 of these North American trainers with slots and flaps have been ordered by France for delivery (Morrison)



# A Soarer Without a Tail

A Soaring Plane That Performs With Exceptional Stability and Provides Unlimited Flights

By HENRY STRUCK

The tailless soarer in full flight: One of the finest of this type ever designed

THE tremendous success of the conventional tractor airplane has brought about its acceptance by most model builders as the ultimate in contest design. Consequently few have thought it worth while or necessary to delve into the so-called "freak" or novelty field. That such ventures are worthy of anyone's efforts may be readily seen from one of our own trips into these "dark woods" of model airplaning, which resulted in the capture of a spirally and longitudinally stable tailless soarer.

The relocation of the corrective force of the dihedral angle, ahead of the center of gravity, through the use of a straight center section coupled with generous reverse camber and sweepback of the wing tips, is responsible for the unusual amount of stability in our design. With the stability problem overcome, the natural advantages of low drag, great efficiency and lighter yet stronger construction of the tailless type may be utilized to their fullest degree.

The first model we constructed was lost out of sight after seven minutes on its second flight from a tow-line. Another model was enthusiastically completed which performed even better, frequently soaring hand-launched! This plane was entered in a tow-line contest where it made the only real soaring flight in the weak currents of late afternoon. The time was five minutes, forty-nine seconds, out-of-sight.

The actual launching of the tailless, or for that matter of any other tow-line glider, is greatly facilitated by the use of an auxiliary rudder or "golf club." We all know that a fairly tight circle is required for effective soaring flight. With such an adjustment the towing of a glider is an almost impossible task. However when the rudder of the "golf club" is set to counteract the turn of the glider, it is easy to get the model as high as the line will allow. The further advantages of permitting the tow-line to be moved forward or back for varying wind conditions without different hooks, and the definite release caused by the drag of the rudder, make this device a most practical piece of tow-line glider equipment.

Due to the exceedingly simple construction, scarcely a day's work is necessary to turn out a tailless soarer. Before beginning actual construction it is best to make a full size drawing of the entire wing and other

parts. Dimensions not given on the plans may be quickly found by doubling the measurements taken from the drawing, unless otherwise noted on the "Scale." The curved parts are marked off in one-quarter inch squares to aid in their reproduction.

Soft balsa of the quarter-grained variety used throughout makes it possible to construct this model of 110 square inch area as light as 1.1 ounces.

The first thing to do is to trace the wing ribs, given full size, on 1/16" sheet balsa. Seven No. 1 ribs and two each of all others

raised but remains parallel to the surface of the board. Insert the remainder of the ribs, the main spar of 1/8" sheet which is 1/4" high in the center section and tapered to 5/32" at the tip, and the stiffener spar of 1/16" square.

When the wing frame is thoroughly dry remove from the board and put 2 1/8" dihedral in each side of the center section. The outer panels are rejoined without dihedral, other than that caused by the taper of the wing.

The leading edge is carefully covered with 1/32" sheet balsa as far as the rear of the stiffener spar. Sandpaper the completed wing smooth and apply several extra coats of cement at all important points, particularly at the dihedral joints.

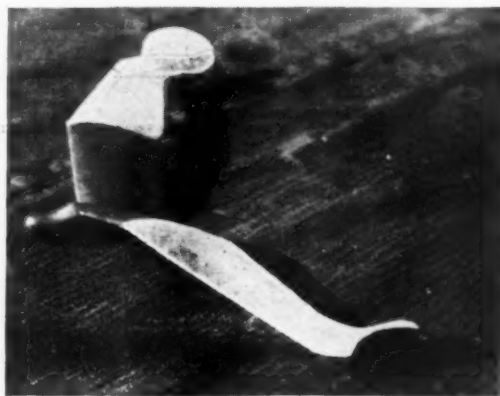
Cover the wing in conventional manner using separate pieces of colored tissue for each panel. The tissue must be doped to the undercamber of all ribs and to the top of the reverse camber No. 5 rib. The covered wing is lightly sprayed with water and doped when dry. Check the "wash out" of the wing frequently while drying during both the above operations. Distortion can be prevented by holding in the proper position until the covering has tightened.

The rudders are cut from 1/32" sheet balsa. A brace strip 1/32" x 3/8" is cemented across the grain to the inside of each to prevent splitting. They are covered on both sides, doping the tissue to the entire surface. Balsa surfaces treated in this fashion never warp and also retain well any adjustments made in them. Cement the rudders against each No. 6 rib, carefully checking their alignment in all directions.

Elevator trimmer tabs snipped from .005 sheet aluminum are forced into and cemented to the trailing edge.

A block 1 1/4" x 2 1/2" x 6" of soft balsa is required for the fuselage. The top outline is transferred to the 1 1/4" surface. After the block is cut to this shape the side pattern is similarly treated. The body is

(Continued on page 54)

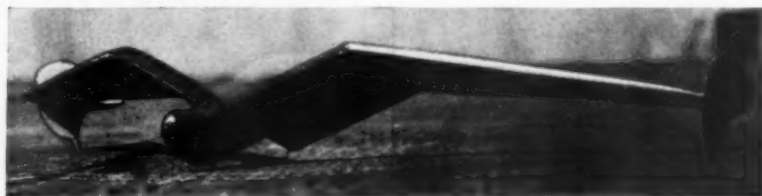


The reverse camber wing tips provide perfect longitudinal stability

are required. Note that the noses of the ribs are recessed to receive a 1/32" sheet balsa covering; also that No. 6 ribs are of 1/4" sheet.

The trailing edge is built up of sections of 1/8" sheet glued together. Pin the trailing edge to a soft board, raising the portions from 1A outward to a height of 1 1/8" at the tips. Remember that the center section is to be perfectly flat. Only the sweepback panels are warped or "washed out."

The center No. 1, the No. 1A's and the No. 5 ribs are cemented to the trailing edge. The leading edge is glued against the noses of these ribs. The leading edge is NOT



The straight dihedral center section gives lateral stability without yaw



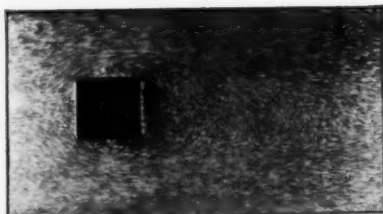


Fig. 1. Square. Notice high pressure in front, vacuum in rear. Resistance proportional to cross section area.

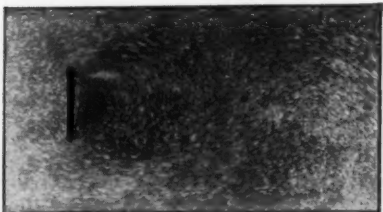


Fig. 2. Flat plate. Resistance about same as square (or oblong).

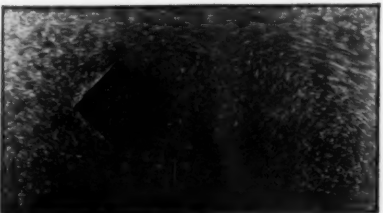


Fig. 3. Diamond. Cross of fuselage on edge incline. Slightly better than square.

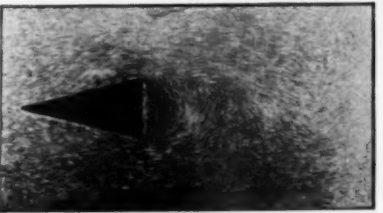


Fig. 4. Large drag produced at rear. Notice the swirl behind it.

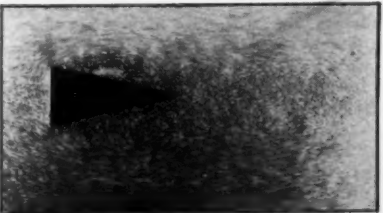


Fig. 5. Here the point is to the rear. This produces less resistance than point to the front. However flat point causes great pressure.

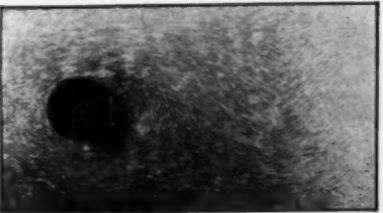


Fig. 6. The circle causes least resistance of any simple geometric shape.

# STREAMLINES

Here You See the Effects of Forces That Pull Back on Your Model When It Is In Flight, and How You Can Shape the Plane's Structure to Reduce Drag

By ROY MARQUARDT

MODEL builders often wonder—WHY STREAMLINE? We are tempted to make box fuselages, struts, etc., to simplify things. Fortunately we can easily see the error in this by doing a little math. We find the surprising result that a single square foot of flat plate at the speed of a Thompson Trophy winner gives a drag of 240 lbs.! A good heavy weight to carry around! In fact, it would absorb 120 hp. just to keep this single square foot traveling at that speed. On the other hand, streamlining could reduce the hp. so much that a couple of Forsters could just about do the trick!

Or, in the other direction, we might have 100 square feet, a good sized barn door hung on the ship—if streamlined—and it would absorb no more hp.!

Yes, there is no doubt about it, streamlining is important. Even at 20 m.p.h., a usual gas model speed, a big square firewall such as we've seen on some jobs can absorb 1/5 the hp. of a Brown. No wonder some of the boys kick that their tubs just don't have any "umph"!

Probably by now you are convinced of the importance of streamlining, but you are wondering if, since we have been talking about math, there isn't some accurate way of going about the whole thing. Later we will present some wind tunnel data which will make accurate computations possible, but at present let me introduce a new method whereby you can actually SEE the results.

Large plane experimenters frequently use smoke but for our work another method seems better. Water, at low speeds, flows around objects in almost the same way as air. If the water is topped with aluminum powder, we may think of each aluminum

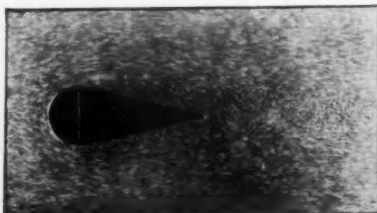
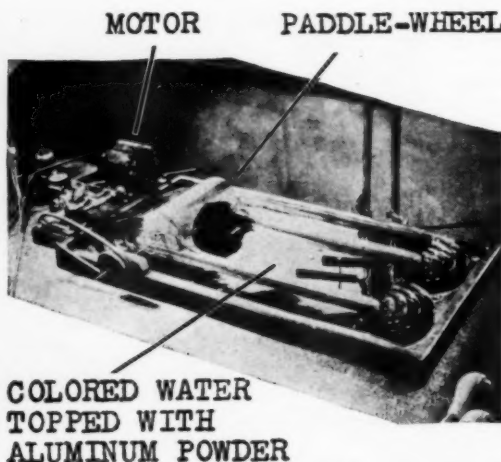


Fig. 7. Combining semi-circle and triangle reduces resistance considerably. However flat sides cause drag.

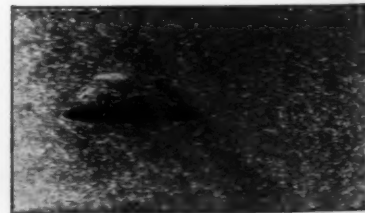


Fig. 9. Greatest cross section at about 34% back from the nose gives the best results. This is a standard NACA M-2 section.

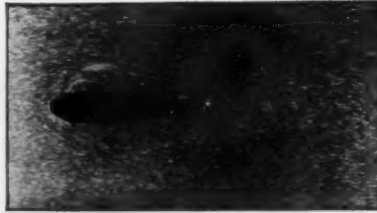


Fig. 8. Greatest cross section at 28% of chord gives better results.



Fig. 10. This shows flow around section with thickness doubled.



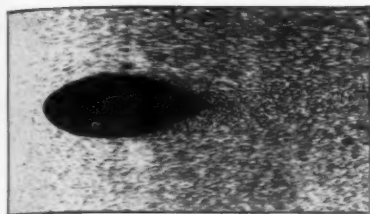


Fig. 11. Flow around section with thickness quadrupled. Notice whirls at rear.

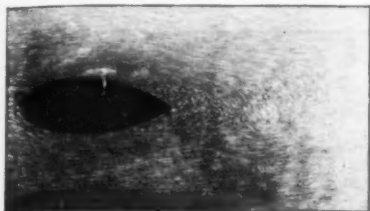


Fig. 12. Sections like these are better at low speeds than at high speeds.

particle as representing an air molecule. Best of all, the aluminum is easily photographed so that our results are available for all to examine.

Our study will be divided into two sections: first—streamlining; second—lift.

But before we examine the pictures in detail, let us review some of the mathematics involved. Obviously size is important. Any force on an object will vary directly with the size. If it is twice as large it will have twice the force. The most important variation, however, depends upon the speed. Consider air passing a stationary object. If we double the speed, there will be twice as many air particles hitting the object, and each particle will be hitting twice as hard. Therefore, the force varies according to the square of the speed—twice as great a speed having four times the force. This is of tremendous importance at high speeds as witness the 120 hp. absorbed by the flat plate on our Thompson Trophy winner.

Our formula, then, becomes  $FORCE = AREA \times VELOCITY^2 \times a \text{ COEFFICIENT}$



Fig. 13. Notice the effect of a rough surface. The rough surface causes whirls and creates great resistance.



Fig. 14. Two sections close together, as shown, give four times the drag of one section.

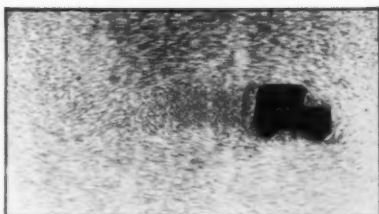


Fig. 15. Notice turbulence produced by 1920 car.



Fig. 16. A trailer at the rear fills in the vacuum and reduces the resistance.



Fig. 17. Better but far from perfect—the under part of body causes drag.

CIENT (depending upon the shape). In the past few years a new formula has been adopted. Theoretically, from principles beyond the scope of this article, it can be shown that air against a flat plate will produce a  $FORCE = DENSITY \text{ OF AIR}$

$\times AREA \times VELOCITY^2 \left( \frac{d}{2} = \text{approximately } .0012 \text{ at standard conditions. Velocity is in ft. per sec.} \right)$  A constant ( $C_d$ ) is, therefore, for a flat plate approximately 1. This is very useful for comparison. For example, if the flat plate is turned into a kite position, and shaped into an airfoil, the coefficient (now  $C_L$ ) may become  $1/2$  again as great. If streamlined, the drag coefficient may go down to .01. The reasons will appear in the pictures.

Let us first consider a series of geometric shapes. The simplest is a flat plate or cube (Pictures 1 and 2). The length along the airflow ordinarily makes little difference; it is only necessary to consider the cross-sectional area. Notice the sharp curvature of the air at the front of the section. Pressure builds up here considerably. The air does not flow immediately around the section but leaves a spotty area of very low pressure. This vacuum is frequently more important than the high pressure in front.

In an attempt to reduce the front pressure area, we experimented with a triangle with the point to the front (Picture No. 4). This was an improvement but showed a tremendous drag in the rear. Notice that the pressure is so low that the air is sucked in immediately in twirls.

Reversing the triangle reversed the situation, being much better in back, and actu-

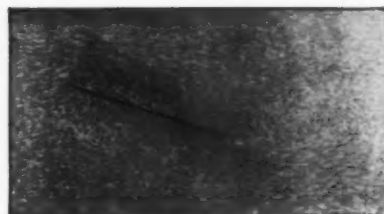


Fig. 18. A flat plate induces high drag with little lift.



Fig. 19. The long lines over the McBride section indicate a high vacuum at this point and great lift.

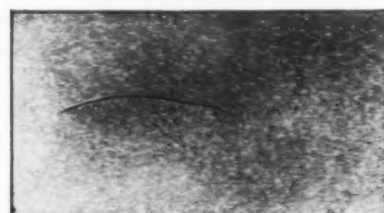


Fig. 20. A curved section is very effective at low angles. Notice drag on the nose.

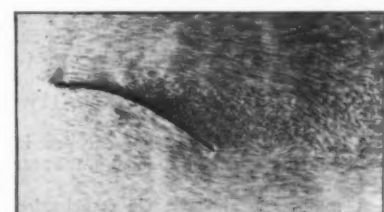


Fig. 21. At high angles the drag is great and lifts more. Notice whirls.

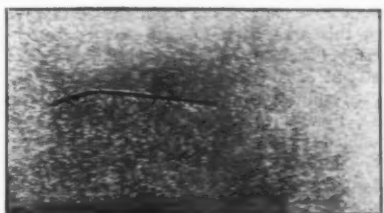


Fig. 22. Moving the hump forward increases both the lift and drag.

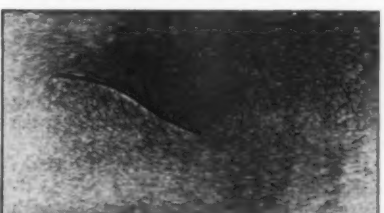


Fig. 23. The turned-up trailing edge increases the stalling angle and speed as well as the C.P. travel. This has great possibilities.

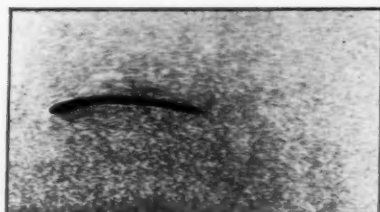


Fig. 24. The S-11 airfoil with bulgy nose and thickened section. The drag is reduced in this case.

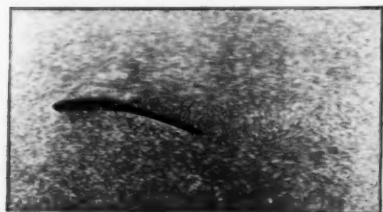


Fig. 25. The lift is very high.

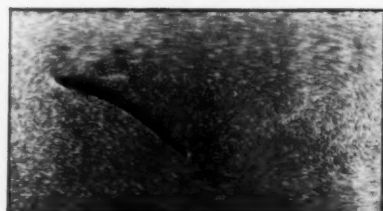


Fig. 26. A slight up turn on the bottom of the trailing edge makes it very stable and reduces stalling.

ally showing less drag (Picture No. 5).

A diamond, a combination of the two (a diamond fuselage in a climb), shows the least drag of any straight line shapes (Picture No. 3).

A circle is still better, being excellent in front but still showing a vacuum in the rear (Picture No. 6).

A semi-circle and triangle combination proves to be the nearest streamlined of geometric forms (Picture No. 7). It has, however, its greatest cross-section at a point about 20% back of the leading edge. Moving this area back to 28% gave a better result (Picture No. 8), and still farther back at 35% (a standard M2 section) the best results were obtained (Picture No. 9). We now have an airfoil which can be doubled (Picture No. 10), or even quadrupled (Picture No. 11) without much greater drag coefficient. These thick sections have more use in model work than on large planes. Witness the use of chubby blimps traveling at low speed—approximately the same relation between air speed and size as in model work. However, never make a streamlined section thicker than 8% of its length unless you have to for a special purpose. Picture No. 12 illustrates the effect of increasing the air speed. Notice that about the same area is affected, but the swirls become much more pronounced.

It is also important to have all surfaces as smooth as possible. Picture No. 13 illustrates a rough-surfaced, double M2 with bumps. Since the air molecules are very small it is necessary to get all surfaces just as smooth as possible. If magnified, each bump is shown to produce its own tiny



Fig. 27. The Eiffel 431 is a similar section and causes high efficiency.

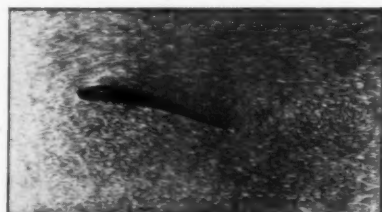


Fig. 28. Eiffel 431 at about four degrees.



Fig. 29. Eiffel 431 at about twenty degrees.

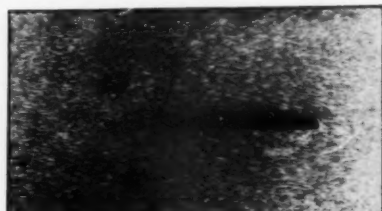


Fig. 30. By flattening the body a Clark Y section is formed.

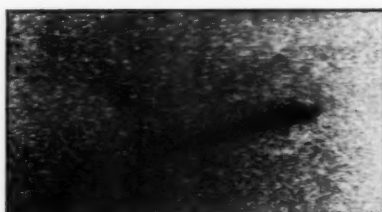


Fig. 31. Clark Y at about fifteen degrees.



Fig. 32. Clark Y at about twenty-five degrees.

twirl. Even a coat of wax smoothing out extremely fine bumps on large ships may add as much as 10 m.p.h. to the speed. Nat-

(Continued on page 44)

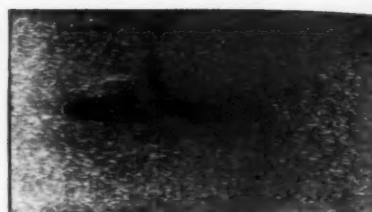


Fig. 33. Curve down the bottom surfaces and you have an M-6 section, giving low drag.

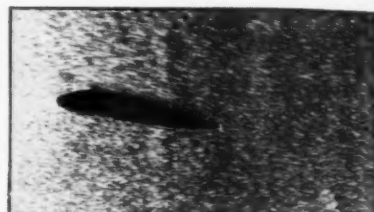


Fig. 34. The M-6 at low angle of attack. A very fast section.

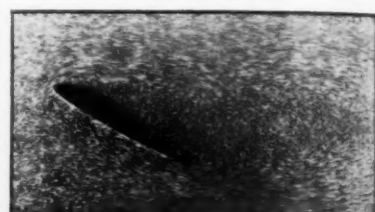


Fig. 35. The M-6 has a high stalling angle.



Fig. 36. Flow around negatively staggered surfaces.



Fig. 37. Flow around positively staggered surfaces.

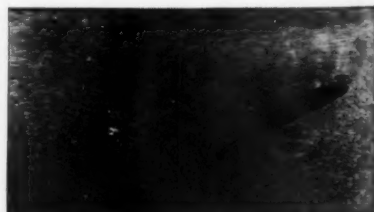


Fig. 38. This shows the effect of a wing slot which reduces the "boiling" over the upper surfaces at the rear of the section when the wing is at high angles of attack. This reduces stalling dangers.

By LEON SHULMAN

TO DETERMINE at a glance the wing loading of any gas model, provided the area and weight are known, this chart has been designed. The weight of the model may be expressed in pounds or ounces and the area in square feet or inches. The answer is always indicated in ounces per square foot, the standard expression. The chart also will show whether the loading of the model is within the permissible limits; the minimum being eight ounces per square foot and the maximum sixteen ounces, which is shown for all models up to seven square feet.

The horizontal scale at the top of the chart expresses the weight of the model. The upper scale is calibrated in pounds, successive pounds being spaced four divisions apart, and each of the three intervening spaces between each pound may be taken as one-quarter pound more than the box to the left of it. The lower scale is calibrated in ounces to correspond with the pound scale above it. The lower scale progresses four ounces per box.

On the left of the chart will be found the scale showing the areas. The extreme left scale is in square inches, indi-

# WING LOADING At A Glance

cated every four boxes or one square foot apart. The inner scale is in square feet shown at quarter-square-foot intervals.

To find the wing loading of a model, find the weight on the top of the chart and the area on the side. Where the vertical column in which the weight is represented intersects the horizontal line on which the area reading happens to be, there will be found the correct wing loading.

As an example:

A gas model weighs 3-1/4 pounds (52

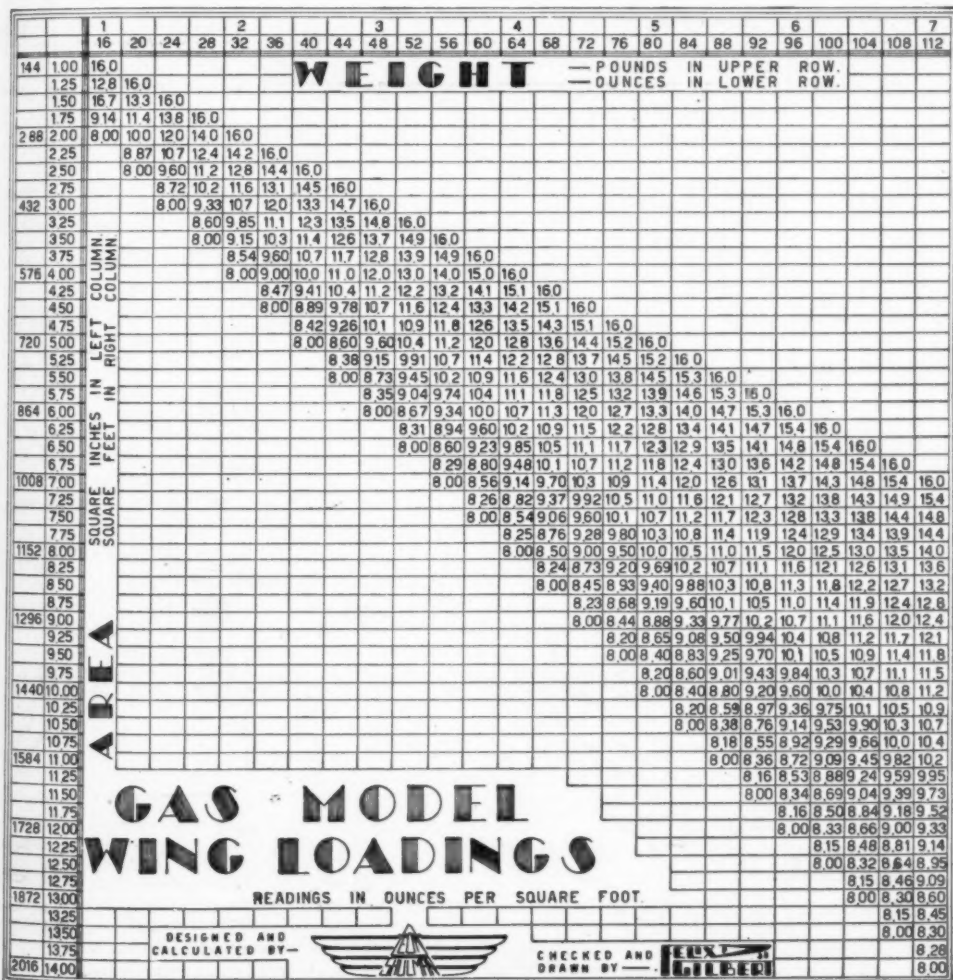
ounces), and has an area of 4.75 square feet. Where the corresponding columns intersect the answer will be found to be 10.9 oz./sq. ft.

If the columns happen to intersect in the large blank space on the left, the ship is underweight; if they intersect on the right blank area, the ship is overweight. This latter situation is allowed as long as the weight itself does not exceed seven pounds.

This chart will give readings for all gas models from one pound in weight to seven pounds and having an area of from one square foot to fourteen square feet.

It will allow you to determine, at a glance, whether or not your plane will fall within the wing loading specifications required by N.A.A. contest rules. Of course, in any contest you will wish to have your ship give as fine a performance as possible. Therefore it should have the minimum wing loading allowable; which is 8 oz. per sq. ft.

If your ship is to have a definite wing area then you may use the chart to determine the exact weight that the ship will have in order that the wing loading will be 8 oz. per sq. ft. For instance, if the area of the wing is 1008 sq. in., the ship will have to weigh 3 1/2 lb., in order that the wing loading will be 8 oz. per sq. ft. Conversely, if you wish to build your ship to a particular weight, say 3 1/2 lb., then the amount of wing area that will be required for any wing loading may be determined readily.











Three "flight" pictures of this plane that disclose its fine stability and realistic appearance

# Build and Fly The Fairchild "82"

**How You Can Create a Realistic Rugged Scale Model That Embodies Exceptional Qualities For Long Flight Duration**

**By JESSE DAVIDSON**

INDIANAPOLIS for her annual auto classics; Aberdeen, Dahlgren, Monmouth for their military weapons. . . proving grounds all. Yet amid the vast and otherwise inaccessible regions of northern Canada lie the proving grounds for the world's aircraft. . .

Not quite a decade had elapsed since the termination of the World War, when Canada actually began to discover her own country. Millions of square miles of wilderness containing enormous natural resources had for years remained virgin. Suddenly this great discovery had taken place; and once it was realized that the airplane could be relied upon, civilization on wings came swiftly to scores of remote areas.

Displacing the old canoe and pack horse, aircraft brought the geologist deep into the interior, making it possible to investigate isolated mineralized areas. To the forester it provided a panorama of millions of acres of developed and maturing woodlands—for Canada is the largest producer of newsprint in the world. And to the topographical engineer it disclosed vast drainage areas, unnamed lakes and rivers, waterfalls and storage sites.

Airplanes increased the mobility of men, money, machinery and material to newly-opened fields of endeavor. Distant and scattered cities were brought days closer. And so Canada, finding the ideal economic use of aircraft, had at the same time found the key to the door opening her vast riches.

When ten years ago the Canadian Government instituted an experimental air-mail route it looked about for a type of airplane capable of withstanding severe operating conditions under extreme temperatures; to make frequent landings on ice, snow and water; to operate efficiently after long exposure to the elements due to absence of hangar facilities at outlying bases, and which would prove equally adaptable to the constant changing needs. It was quite a large order to exact from



Here's the completed model. The large wing span, long motor and propeller of ample dimensions insure long flights

any kind of plane. But the government had not far to look. For just across the border was the very type of plane to fill the specified need. And since then the name of Fairchild has virtually become a household word in the saga of Canadian aviation.

The Fairchild F C-2's with which aerial operations began, exemplified the ruggedness of this great country and through the years has remained preëminent among aircraft as the ship whose dependability won the confidence and affection that hardy Canadian pilots swear by.

In 1928 it was decided to establish a factory in the Dominion itself due to increasing orders from the Government and independent operators. Financed by \$300,000 of Canadian capital and a like sum from the American Fairchild organization, Fairchild Aircraft Ltd. was founded. An entirely self-contained enterprise with a Canadian president and directors, it does its own engineering, manufacturing and sales.

Redesigned and improved but nevertheless characteristically retaining their rugged individualism, Fairchild cabin planes still operate with unfailing stamina—proven thoroughbreds by gruelling years in the proving grounds of the world's aircraft.

For the past two years the Fairchild company has been engaged in the production of a type known as the "82." A husky, single-motored transport, modern in every detail, it bears semblance to its worthy

predecessor, the famous F C-2. The "82" cabin ships are used extensively for freighting between the rail head and mining districts of Northern Canada and quite a fleet are employed in such service. In Mexico, Argentina and Venezuela others are engaged as passenger transports and photographic ships. The necessity for a plane capable of carrying large loads and freedom from maintenance makes the Fairchild "82" a world-wide popular ship.

A description of the Fairchild "82" is as follows:

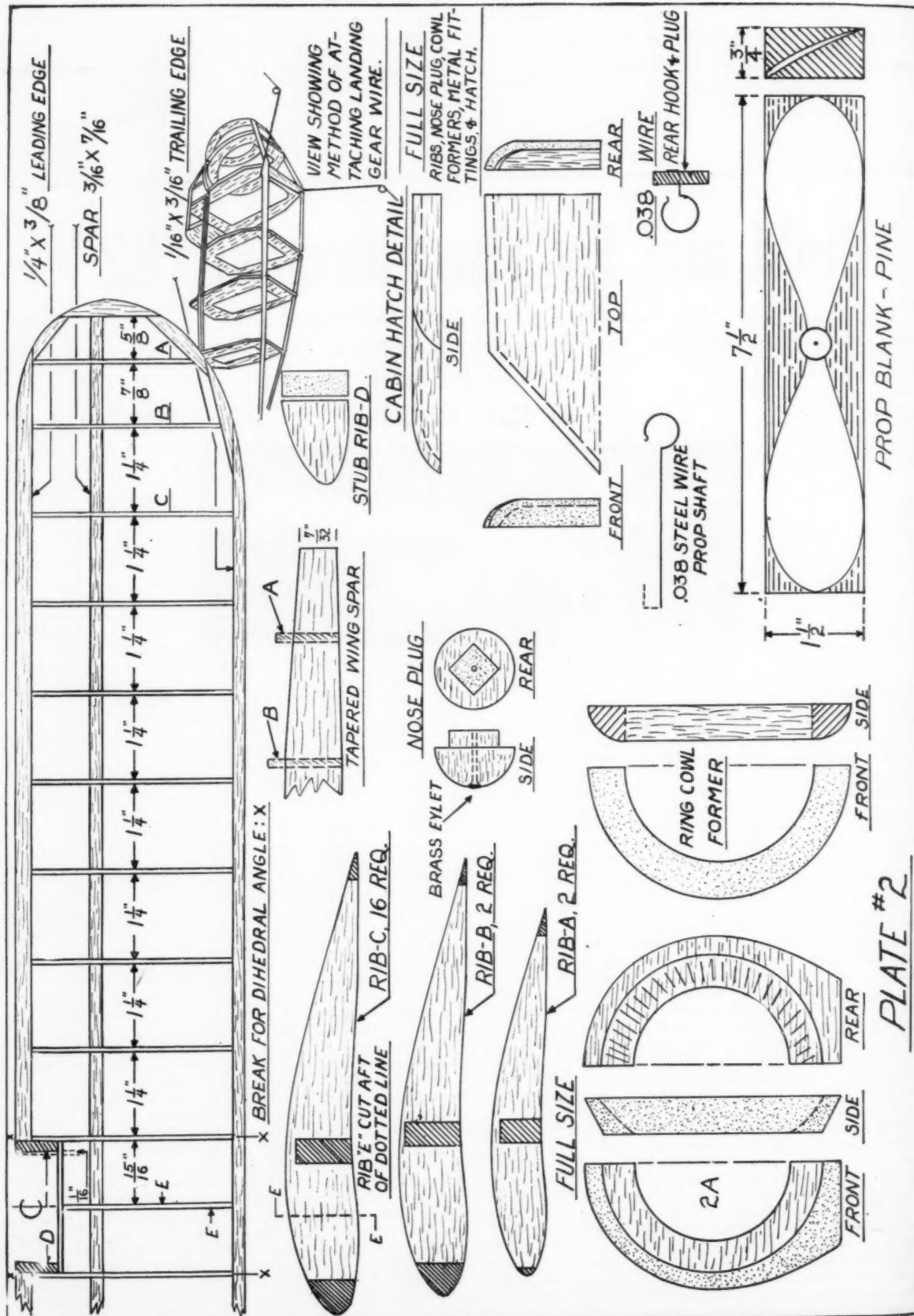
A high-wing cabin monoplane with folding wings, it is easily convertible on floats, wheels or skis. With a span of 51 feet and powered with a Pratt & Whitney Wasp S3H1 550 HP. engine, it is capable of carrying twelve persons. Propelled by a Hamilton Standard Controllable, the ship takes off fully loaded (land plane) no wind, in 11 seconds. Cruises with 75% power at 141 m.p.h. Top speed with full power is 155 m.p.h. Fuel consumption at 65% power is 25 gallons per hour. Its service ceiling is 17,000 ft. Cruising range fully gassed, at 65% power is 657 miles.

## Fuselage Construction

The fuselage bulkheads numbered 3 to 12 inclusive are cut to the full size and shape as illustrated on plate 1. The longerons should be selected from straight grained balsa, 1/8" square cut to the required length. Note that the lower set of longerons must be cracked slightly at the points indicated on the side view drawing. Cement is then applied over these cracks and allowed to harden.

The next step is to cement the aforementioned bulkheads in their respective positions along the lower longerons. The upper longerons are attached starting at bulkhead number 8. Note that the longerons on both the upper and lower part of the bulkheads project outside the bulkheads themselves. This is exemplified by bulkhead number 8. The extreme end of

(Continued on page 50)





# Ocean Spanning Razor Blade

## The Plane On The Cover

HE IS not a tall man. He is thin, suave, now middle-aged. He is an aviation pioneer for he furnished young Donald Douglas with financial backing for his first airplane factory: a tiny room next door to a barber shop in Los Angeles, almost twenty years ago. He was wealthy, young and handsome; but he was never a playboy. And he has made money, lots of it, from his original inheritance; for he is a hard worker, a clear thinker and above all a courageous man. For the courage of David Richard Davis has made this story possible: the story of our Plane on the Cover, the Con-

solidated Model 31 Flying Boat.

No other single ship in modern aviation history has represented such a complete abandonment of conventionality. As new as the dawning sun which glanced with a dazzling radiance off its sleek metal sides, this astounding sea-going hotel was unveiled a few short weeks ago with the smell of salt sea air from San Diego Bay mingling with the rhythmic staccato bark of the rivet guns at work on another of its kind in the mammoth factory of its birthplace. It is such an unparalleled aviation triumph that those

**By ROBERT McLARREN**

of us who witnessed its debut gasped in awed astonishment at first sight of the monstrous yet lithe creation.

David R. Davis had waited ten years for that morning. Years, not of idle anticipation, but a decade of hard, nerve-wracking toil on a formula for a wing section. Aviation needed that set of coordinates, has needed them for a long time. For since Col. V. E. Clark's famous "Y" airfoil was introduced in the middle twenties, few designers have dared use anything which departed too much from its basic principles. But now they need wait no longer for Consolidated has dared to prove that an aerodynamically "perfect" wing is not completely theoretical; it is practical and sensible.

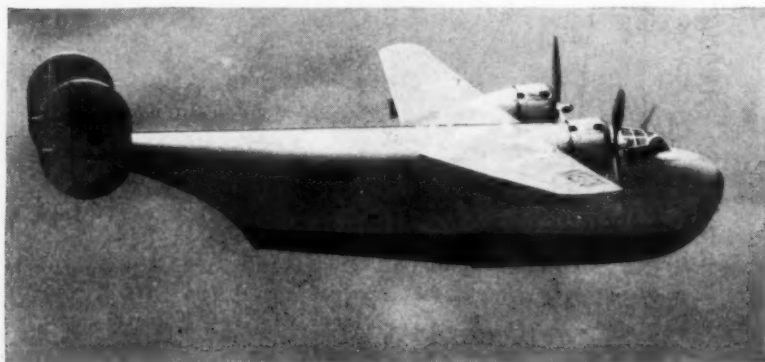
Fundamentally, Davis' wing is a practically perfect wing curve. Its maximum lift is developed at its minimum positive angle of attack which means two things: the wing will fly at a minimum drag and the hull will take off and alight horizontally on the water, not bucking and pitching with its nose high in the air as to-day's seacraft are prone to do.

And what does having this "perfect wing" mean to aviation? Consolidated has answered that question with their twenty-five ton model 31: a greater lifting power

(Continued on page 59)



The Consolidated 31 shaving the air at 275 m.p.h.



With its 4000 h.p. it carries 57 passengers and crew

**By AL LEWIS**

NOW let's consider the case of some builders . . . first they ponder over the type of ship they'll undertake next . . . then they spend a day, or perhaps a week, thumbing through back issues of MODEL AIRPLANE NEWS to select a keen design—or maybe they purchase one of the many fine kits offered by MODEL AIRPLANE NEWS' advertisers—or design their own plane, basing its proportions and potential performance on data gathered from experience and the proven principles of design found in Mr. Grant's monthly articles . . . then with materials in one hand, plan in the other and a pocketful of dreams which includes winning a championship contest, they commence construction.

Many a patient and enjoyable hour is passed in building the ship—lining up longerons—reinforcing those points which will be subjected to strain—putting every-

# THE INSTRUCTOR Raises A Warning Finger



thing they have learned into their work. Then too frequently what do these modelers do? Towards the end they speed up "production" in an effort to enter a coming contest, or have the model in the air by Saturday afternoon.

It doesn't make sense: Careful preparations, then too-quick completion. Maybe the builder doesn't take time to inscribe his name and address on the plane—only to stand helplessly by later as it soars out of sight in a thermal . . . or mayhaps those all-too-important test hops were skipped—

perhaps the wing was not securely bound to the fuselage. Just overlooking one of those many small details that are so important before getting the ship into the air under full power!

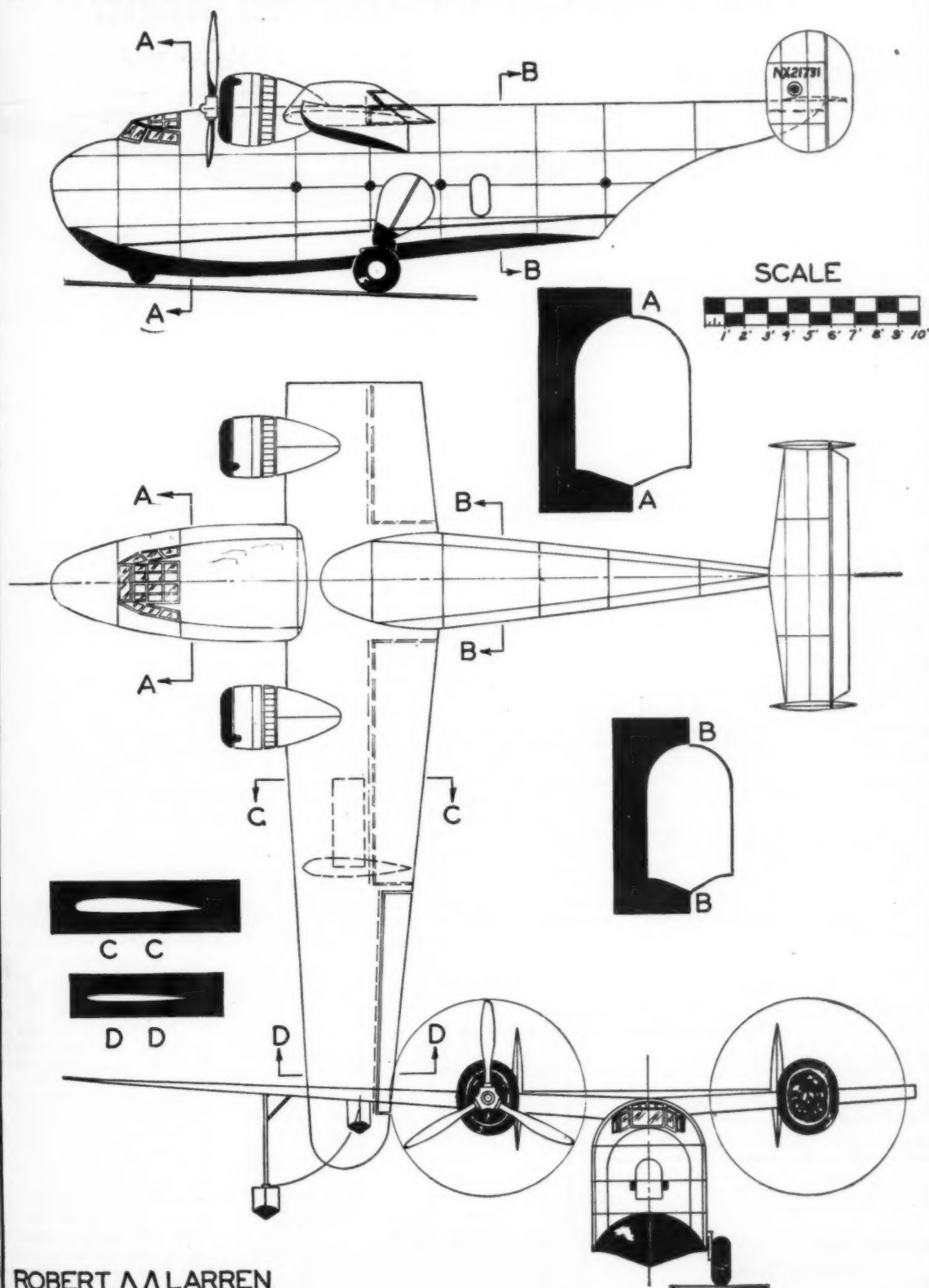
Too many ships crack up because a competent contestant skipped a minor detail or two in his haste to have the plane perform.

Take it easy, will you, chums, and check on all those items? It'll repay you with more winning flights, more all-round

(Continued on page 53)



# CONSOLIDATED MYSTERY FLYING BOAT



ROBERT M LARREN  
C

# The Physics of the Airplane

## Molecular Forces and Motions

AN AIR Corps Attack airplane roars upward through a wintry, overcast sky, its Twin Wasp engine bellowing its defiance to the adverse elements. Precipitation, or heavy moisture content, is evidenced by the blackened underside of the pendulous cumulus clouds, bulging and sagging with their weight of water. The attack plane emerges finally into the clear upper atmosphere "on top" and over the overcast. The shiny silver wings are coated with a glistening blanket of hard glazed ice which the efficient de-icers crack off from the leading edge easily. This incident happens frequently in the routine course of cross-country flying. The layman ponders and then asks himself, "What phenomenon has just transpired?" The answer is simple. Merely the change of state of matter; in our case, the transformation of moisture from a liquid into a solid state. The moisture of the clouds becomes solid ice under sufficiently lowered temperature conditions encountered at high altitude.

To review briefly, we recall from the initial article of this series that all matter occurs in one of three states. It may be a solid like ice, or the metals and woods which constitute the airplane structure proper; a liquid like water, chemically coolants or gasoline engine fuel; lastly, it may occur in the form of a gas, like atmosphere which is all about us, or the helium which provides the lifting element for the dirigibles. Whichever of the three forms outlined previously is assumed by matter, it is constituted of very small particles. These particles are termed molecules. In between the molecules constituting a substance are unoccupied spaces. The molecules are not in a state of complete rest, as we would reasonably assume, but are in constant and rapid motion. This condition of molecular motion embraces what may be termed the "kinetic

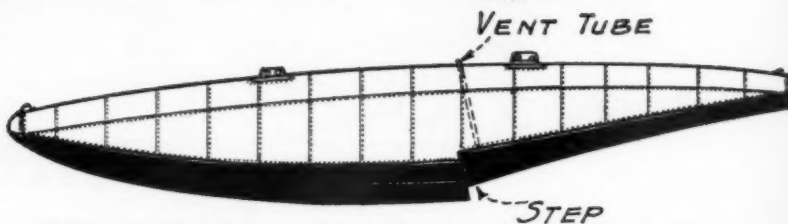


Figure 2. Showing the position of the vent in a single step seaplane float.

By LT. JAMES P. EAMES and WILLIS L. NYE

theory." For the sake of accuracy, a further classification of the elements of matter is embodied in the "quanta" theory and the assumption that matter is eventually composed of positive and negative electric charges but such is beyond the scope of this discussion.

The three initial states of matter differ from each other primarily as a result of the variations in the distance of the molecules from each other. For instance, a solid could be defined as "that state of matter in which the molecules cling securely together and tend to maintain their relative position." In a liquid, the molecules tend to cling together, but are free to move with respect to each other. We know this to be true since liquids conform easily to the shape of any container into which they may be poured. Aviation gasoline, for instance, can be transported as easily in a cylindrical tank as in a rectangular tank. However, although liquids do not tend to resist a change in shape, they do quite definitely resist any change in their volumes. In other words, liquids do not respond to compression. Gases, on the other hand, differ radically from solids and liquids in that their molecules are free to move about freely without restraint. For instance, in order to obtain the requisite compression for subsequent expansion and power in an aircraft internal combustion engine, the liquid gasoline must be mixed with atmospheric air in suitable proportions in order to effect the transformation to the gaseous state. Only then

can it be compressed. Thus it can be readily understood that gaseous molecules tend to separate indefinitely. Gases do not at all resist forces which tend to change their shape and only to a small degree do they resist forces which tend to change their volume. This is so because the inherent inertia of a gas is less to a considerable degree than a liquid.

The reasons for believing that matter, in any or all of its states, is made up of molecules which are in a constant state of motion are all predicated upon the observed behavior of gases. The property of rapid expansion into a free space is alone ample proof of rapid molecular motion in a gas. A good example of this is found in the operating cycle of a modern high speed aircraft gasoline engine. The inlet valve presents an extremely narrow opening for only a very small fraction of a second. Yet, this brief period suffices for the combustible mixture of gasoline and atmospheric air to enter, attain a high degree of saturation and interchangeability of the molecules and completely fill the combustion chamber of the cylinder. In fact, the velocity of gases in an internal combustion engine attains velocities which are difficult for the layman to comprehend. Yet, this cycle of events in a gasoline engine takes place every time the engine is operated, and does so intermittently over long periods of hours.

Some examples will be of interest in this connection. For the sake of illustration, when a difference of pressure exists

between the carburetor and the inlet valve, of one pound per square inch, the gas will attain a velocity of 320 feet per second. For the sake of efficiency, the gas velocity should not vary much from a range of 250 to 300 feet per second. In conventional aero engines, the gas vapor velocity ranges from 116 f.p.s. through the inlet valve port, 300 f.p.s. in the carburetor choke tube and approximately 170 f.p.s. through the exhaust port. The figures given above are derived from empirical equations and various engines, of course, may show various figures, all in accordance with the design of the engine. All gases

(Continued on page 47)

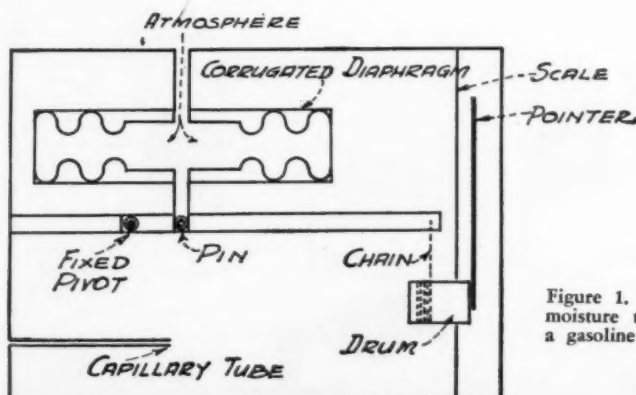
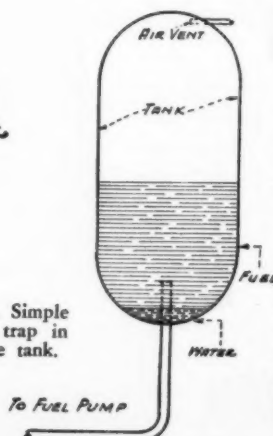


Figure 3. Schematic diagram of a rate or climb indicator.

Figure 1. Simple moisture trap in a gasoline tank.



## 1939 "NATIONALS" WINNERS

## OUTDOOR CABIN CONTEST

Admiral Moffett Eliminations  
Jr.-Sr. Age Div.

Robt. Toft.....19	Minneapolis, Minn.....765.33	Stout Perpetual Trophy
Geo. Reich.....18	Cleveland, Ohio.....515.53	Peerless Model Airpl. Tr.
Edward Naudzius.....20	Detroit, Mich.....444.73	Fleetwings Trophy
Walter Dickinson.....20	Newark, N. J.....440.46	Scient. Mercury & Xch. Cl.
Robt. Lichten.....17	Philadelphia, Pa.....439.53	Starliner and Xch. Cl.
Earl Stahl.....20	Johnstown, Pa.....392.46	Exchange Club Award
Robt. Romeisen.....15	Indianapolis, Ind.....352.66	Exchange Club Award
Lawrence Cowell.....15	Pontiac, Mich.....308.06	Exchange Club Award
Jos. Vermoch.....20	Chicago, Ill.....300.40	Exchange Club Award
Abraham Adler.....17	Philadelphia, Pa.....294.66	Exchange Club Award
Ervin Leshner.....20	Philadelphia, Pa.....285.20	Comet Award
Ted Just.....17	Johnstown, Pa.....261.06	Comet Award
Rodney Streed.....19	Waukegan, Ill.....241.13	Socony Vacuum Medal
Arthur Koslow.....18	Perth Amboy, N. J.....227.20	Socony Vacuum Medal
Gilbert Shurman.....17	New York City.....215.33	Socony Vacuum Medal

## OPEN AGE DIV.

V. C. Davis.....24	Houston, Texas.....527.13	Guillow Award
Kenwood Carter.....29	1017 Maynor, Nash-ville, Tenn.....503.73	OK Mtr. & Xch. Pl.
Kenneth Carpenter.....21	Akron, Ohio.....294.46	Starliner Xch. Pl.
Robert Redder.....21	Chicago, Ill.....262.00	
Henry Thomas.....23	1353 Grant, Akron, Ohio.....204.80	Xch. Cl. Awd.
Henry Struck.....22	1917 Roosevelt, Jack. Hghts., L. I.....185.60	Xch. Cl. Awd.
Dick Korda.....24	Cleveland, Ohio.....183.53	Xch. Cl. Awd.
Stephen Thomas.....23	Akron, Ohio.....176.06	Xch. Cl. Awd.
Frank Plachy.....23	Chicago, Ill.....160.60	Xch. Cl. Awd.
Steve Herchick.....21	Bridgeport, Conn.....134.26	Comet Award
M. W. Anderson.....21	Staten Island, N. Y.....133.80	Comet Award
Dick Everett.....21	Elm Grove, W. Va.....123.00	Soc. Vac. Medal
Curtiss Janke.....23	Sheboygan, Wis.....122.66	Soc. Vac. Medal
Leo Bailey.....21	Akron, Ohio.....122.53	Soc. Vac. Medal
Robt. Redder.....21	Chicago, Ill.....118.66	Soc. Vac. Medal

## WAKEFIELD INTERNATIONAL CONTEST ELIMINATIONS

Dick Korda.....24	Cleveland.....263.66	Open
James Cahill.....21	Indianapolis.....180.66	Mechanix Illustrated Cup
Fred Mees.....24	Columbus.....156.46	Synco Ace Engine & Ex. Medal
Jas. Noonan.....22	Milwaukee.....141.33	Comet Award
Walter March.....21	Chicago.....116.33	Comet Award
John Kubilis.....21	Chicago.....114.06	Comet Award
Conrad Renning.....28	Minneapolis.....106.06	Comet Award
H. Thomas, Jr.....23	Akron, Ohio.....89.66	Metro. Exch. Cncl. Medal
Magnus Anderson.....21	Staten Island.....87.40	Metro. Exch. Cncl. Medal
Henry Struck.....22	Jackson Hghts.....85.00	Metro. Exch. Cncl. Medal

## WAKEFIELD INTERNATIONAL CONTEST ELIMINATIONS—JR. AND SR.

R. Gene Chaille.....16	Miami.....489.20	Peerless Model Co. Trophy
Jack Thames.....18	Pittsburgh.....394.33	Fairchild Engine & Airplane Cup
James Bohash.....20	Detroit.....275.66	Synco Bee Engine & Ex. Medal
Arthur Beckington.....16	Rockford.....213.46	Comadore Kit & Exchange Medal
Earl Stahl.....20	Johnstown.....190.60	Xacto Knife & Exchange Medal
Alvie Dague, Jr.....19	Tulsa.....170.93	Xacto Knife
George Johnson.....17	Minneapolis.....167.60	Xacto Knife
Ed. Lingard.....20	Chicago.....165.26	Comet Award
Ray Beaumont.....15	Philadelphia.....160.40	Comet Award
Tony Carrara.....19	Cincinnati.....141.46	Comet Award
Walter Seemiller.....16	Lakeland.....112.53	Comet Award
Harvey Prochnow.....18	St. Paul.....106.80	Metro. Ex. Club Medal

## RADIO CONTROLLED POWER MODEL EVENT

\$100 Walter Good.....89 Points.....	Ed. Roberts Trophy
50 Joe Raspanti.....11 Points.....	General Battery Trophy
30 Elmer Wasman.....9 Points.....	R.C.A.
15 Phillip Sonheim.....8 Points.....	Burgess Battery
15 C. H. Siegfried.....8 Points.....	Baby Cyclone Engine
15 Robt. Mende.....8 Points.....	
15 Ervin Leshner.....8 Points.....	
15 Jesse Bieberman.....6 Points.....	
10 Howard Flanigan.....1 Point.....	
10 Chester Lanzo.....1 Point.....	
Robt. Rose.....0 Point.....	

All radio contestants receive Metropolitan Council Exchange Club Plaque.

## Model America at the Nationals

(Continued from page 9)

and the sun transformed pale complexions to a more rugged hue. Model builders occupied their attention on this day with the Wakefield Eliminations, the Moffett Finals and the Outdoor Flying Scale Model Event.

One of the outstanding features of Thursday's activities was the radio-controlled power model flight made by Walter Good and his brother, Bill. Walter had his model flying over the airport, making right and left turns, figure 8's, downwind and upwind flights, and finally, after a leisurely flight in the direction of the big hangar, the model was brought back to within 100 feet of the starting point and landed with great precision. This was historical, for it was the first radio-controlled power flight ever to take place at a national contest, in which the radio control element was clearly demonstrated. Later in the day Joe Raspanti, with a beautiful ten foot red cabin job made another radio-control flight. Raspanti's flight was excellent and demonstrated complete control up to a point where another radio contestant interrupted Raspanti's control of his model by a practice operation on his radio transmitter. Of course the contestant did not intentionally interfere with the radio plane's operation, but these receivers at present are extremely sensitive and when anyone else operates their transmitter it is nearly impossible to retain control from another transmitter, especially when the ship is a considerable distance from the radio operator. The unintentional interference caused the motor of Raspanti's ship to shut off, and the plane landed while in the act of making a figure 8. It landed safely however and no damage was done. This was one of the factors which prevented him from giving as fine a demonstration as the Good brothers. However he would have had to extend himself considerably in order to equal the show put on by Walter and Bill.

A few contestants with an eye for the coming two days of the meet, tested their gas jobs and made adjustments so that they might not be delayed in their official gas model flights which were scheduled for Friday and Saturday.

On Friday the indoor events were held at the Grosse Ile Airship Dock. Record times were not made. However winners staged flights of over fourteen minutes in both the Stick and Indoor Cabin Events. In the Indoor Stick Event Ed Naudzius of Detroit flew his ship for 17.51 3/5 minutes.

At the Wayne County Airport, where the outdoor events were held, the Gas Models took the air. Unfortunately the field officials prohibited the use of the concrete runways, apparently still failing to realize the importance of the scientific educational work being carried on through model airplane activities. It seems some of the "grown ups" have not developed to maturity sufficiently to realize that these little ships are not being used as toys. The manager of the airport, Mr. Henry Baker, did everything within his power to facilitate the smooth running of the contest and to supply the necessary equipment. However, the Department of Commerce and army regulations were too well tied up with red tape to insure the necessary freedom of activity for

(Continued on page 55)

## BERKELEY Introduces

**The Perfect Lubricant  
for Miniature Engines**

Oil your miniature engine with BERKELEY'S ELEKTRION MOTOR OIL. It gives extra power and prize-winning flying because it creates a running smoothness that makes your motor give all its "gok."

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"Elektrion" is an electrically treated motor oil. By the bombardment of each individual electron of ordinary motor oil, the molecular structure of the oil is changed with resulting improved physical properties.

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**Better "Carbon Test" . . .**

Users testify the carbon deposit from "Elektrion" is insignificant. Your spark plug and piston head stay clean with "Elektrion."

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The electrical bombardment of the electron results in larger size molecules of oil giving "Elektrion" unequalled strength and stability. When used with proper filters in automobiles and aircraft, "Elektrion" need never be changed. (Used for 44,000 miles without changing in a 1937 Ford V-8.)

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WRIGHT AERONAUTICAL CORP. "Elektrion" is a definite improvement in lubricating oils for aircraft engines."

DEHAVILLAND AIRCRAFT CO. "Approved for use in both normal and racing categories."

PRATT & WHITNEY AIRCRAFT CO. "Officially approved on all Pratt & Whitney Engines."

ROLLS-ROYCE "In every way suitable for use in our aero engines."

Model Engine Manufacturers are adopting "Elektrion" for factory testing and "break-in" runs to assure you longer life engines.

**Send . . .**

For the big Berkeley Catalog with three-view drawings: N. A. A. Classifications; "Selecting A Gas Model"; and hundreds of new items. Write for your copy today. It costs you only **10c**

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YOU PAY NO MORE FOR "ELEKTRION" "ELEKTRION" is priced so every model builder can afford the best. You need not take chances, insist on "Elektrion." Sold by reliable dealers everywhere.

**Large 3 oz. can 25c**  
By Mail, 10c extra

**BERKELEY  
Model Supplies**

230 Steuben St., Brooklyn, N.Y.

**AMERICAN WAKEFIELD INTERNATIONAL COMPETITION TEAM**

Robert C. Chaille.....16	Miami.....	8:09.2	Exchange Club Award
Jack Thames.....18	Pittsburgh.....	6:34.3	Exchange Club Award
James Bohash.....20	Detroit.....	4:35.7	Exchange Club Award
Dick Korda.....24	Cleveland.....	4:33.7	Exchange Club Award
James Cahill.....21	Indianapolis.....	Winner of Wakefield contest in Paris last August	Ex. Medal
Ralph Baker.....17	Santa Ana, Cal.....	Winner of the West Coast Elimination	Ex. Model

**AMERICAN MOFFETT INTERNATIONAL COMPETITION TEAM**

Edward J. Naudzius.....20	Detroit, Detroit Chapter N.A.A.....	186.00	Exch. Club Cncl. Awd.
Geo. Reich.....18	Cleveland, Cleveland Balsa Butch.....	147.66	Exch. Club Cncl. Awd.
Robt. Toft.....19	Minneapolis, Minn., Minn. Model Aero Club.....	110.13	Exch. Club Cncl. Awd.
Walter Dickinson.....20	Newark, N. J., Kresge Aero Club.....	98.73	Exch. Club Cncl. Awd.
V. C. Davis, Jr.....24	Houston, Tex., Houston Miniature A.....	60.06	Exch. Club Cncl. Awd.
Kenwood Carter.....29	Nashville, Nashville Aero Club.....	58.20	Exch. Club Cncl. Awd.
Robt. Lichten.....17	Phila., Quaker City M.A.A.....	439.53	Exch. Club Cncl. Awd.

**CANADIAN MOFFETT TEAM**

Lavelle Walters.....27	Windsor, Ont., Can.....	93.93	Exch. Club Cncl. Awd.
Robt. Milligan.....18	Toronto, Ont., Can.....	66.73	Exch. Club Cncl. Awd.
Jeff Harris.....23	Toronto, Ont., Can.....	51.06	Exch. Club Cncl. Awd.
Roy Nelder.....18	Toronto, Ont., Can.....	49.06	Exch. Club Cncl. Awd.
Charles Fairfield.....16	Toronto, Ont., Can.....	34.66	Exch. Club Cncl. Awd.
Harry Lucas.....15	Toronto, Ont., Can.....	30.06	Exch. Club Cncl. Awd.

**MOFFETT INTERNATIONAL COMPETITION WINNER & RUNNERS-UP**

Richard Naudzius.....20	Detroit.....	3:02	IMP, Prop Clock, Moffett Trophy
Geo. Reich.....19	Cleveland.....	2:09.2	
Robt. Toft.....19	Minneapolis.....	1:16.7	
Walter Dickinson.....20	Newark, N. J.....	1:12.9	
Lavelle Walters.....27	Windsor, Ont.....	1:11.3	
Robt. Milligan.....18	Toronto, Ont.....	1:00.9	

**OUTDOOR FLYING SCALE MODEL CONTEST**

	Wrkship and Fid.	Open Flt.	Age Class Pts.	Joy Total Score	Cash Award	
Henry Thomas.....23	39.25	30	69.25	\$25		Thos. Bourne Joy Memorial Trophy
Akron, Ohio						Exchg. Council Awd.
Henry Struck.....22	42.75	25.85	68.60	\$20		Exchg. Council Awd.
New York City						
John Ogilvie.....22	42.75	24.94	67.69	\$15		Exchg. Council Awd.
New York City						
Herbert Wise.....21	25	27.37	52.37	\$10		Exchg. Council Awd.
Akron, Ohio						
Jas. Noonan.....22	38	6.40	32.40	\$ 5		Exchg. Council Awd.
Milwaukee, Wis.						
Roger Hammer.....18	35.75	24.63	60.38			Wm. O'Neil Trophy & Gas Eng. Exchg. Council Awd.
Newark, N. J.						
Anthony Kaslouskas.....18			60.28	12.50		Exchg. Council Awd.
Akron, Ohio						
Rancel Hill.....18	24.50	30	54.50	7.50		Exchg. Council Awd.
Akron, Ohio						
Ted Just.....17	28.25	24.53	52.78	5.00		Exchg. Council Awd.
Johnstown, Pa.						
Martin Phillips.....15	28.75	5.24	33.99			Exchg. Council Awd.
Boston, Mass.						
Harry Lerman.....17	27.	5.95	32.95			Exchg. Council Awd.
Boston, Mass.						
Wm. Hammer.....17			27.75			Exchg. Council Awd.
Milwaukee, Wis.						
Leonard Baer.....15			11.75			Exchg. Council Awd.
Leon Kortas.....16						Exchg. Council Awd.

**INDOOR STICK**

Jr.-Sr.

Ed. Naudzius.....20	Detroit.....	17.51 3/5	Stout Trophy
Alvie Dague, Jr.....19	Tulsa.....	17.29 1/3	C. A. Campbell Solventol Cronogran
John Stokes.....18	Huntington Valley.....	17.07 1/3	Torpedo Engine, Ex. Pl.
Milton Huguelet.....17	Chicago.....	16.09	Synco Saw, Ex. Pla.
Robert Jacobsen.....19	Philadelphia.....	15.08	Camera, Xacto & Pla.
Ted Just.....17	Johnstown.....	15.04 1/3	Ex. Pla.
Gilbert Shurman.....17	New York City.....	14.35 1/2	Ex. Pla.
Charles Belsky.....20	Chicago.....	14.33 1/5	Ex. Pla.
Wilfred Bobier.....15	Detroit.....	14.10	Ex. Pla.



# A CLEAN SWEEP

at the world's biggest meet



## BUNCH MOTORS WIN BAKERSFIELD CONTEST APRIL, 1939 AGAINST 400 ENTRANTS

The world's most modern motors are winning NOW! There is a notable reason for this unexcelled performance. It is an achievement of uniform, big industry manufacturing through Bunch developed methods. Backed by years of active, day-in and day-out experience Bunch Motors have been PROGRESSIVELY developed to set new standards of performance.

When you buy your next engine remember the self-styled champions of the past are not good enough. Bunch Motors, of modern construction, deliver that extra performance, needed staming and rugged dependability that is winning to day!

★ NOTE:—The Bakersfield contest was held under the new limited size motor run rules. Bunch and other regular size engines were required to fly under a 12 oz. per sq. ft. minimum weight loading. This handicap did NOT apply to small bore engines in the same competition.

CONTEST  
DIRECTOR  
NOTES  
BUNCH  
MOTOR  
RECORDS

1ST PLACE  
\$100.00

JOHN BUNCH  
20 min. 20 sec.

3RD PLACE  
\$25.00

HOWARD  
BROUGHTON  
13 min. 9 sec.

5TH PLACE  
1st CHOICE

Merchandise Award  
JIM WILLIAMS, SR.  
12 min. 30 sec.

Frank Knapton, leading N.A.A. official at all Pacific Coast meets says:

"The competition at the 1939 Bakersfield meet was the AVID TEST for champions! With all the experts striving to win the large cash prizes, competition was the keenest I've seen. The first 8 official times above 10 minutes would win any other like contest."

Bunch Motors HAVE THAT something extra to outperform and win 3 leading places in the West's latest, greatest contest.

### SPECIFICATIONS

All Bunch Engines are piston ring equipped. H.P. 1/3 - Bore 7/8 - Stroke 3/4 - Displacement 45-100 cu. in. Assembled engines fully blocktested. Engine kits supplied with all bearings, piston and rings and timer fitted. Includes coil, tank, condenser.

### START WINNING!

SEND FOR A BUNCH MOTOR TODAY! ★ CHECK AND MAIL

Gwin Aero Upright Assembled	\$12.00	<input type="checkbox"/>
Gwin Aero Inverted Assembled	12.50	<input type="checkbox"/>
Gwin Aero Upright Kit	9.85	<input type="checkbox"/>
Gwin Aero Inverted Kit	9.85	<input type="checkbox"/>
Mighty Midget Upright Assembled	9.50	<input type="checkbox"/>
Mighty Midget Inverted Assembled	9.75	<input type="checkbox"/>
Mighty Midget Upright Kit	7.85	<input type="checkbox"/>
Mighty Midget Inverted Kit	7.85	<input type="checkbox"/>
Mighty Marine Speedboat Engine	12.50	<input type="checkbox"/>
Mighty Marine Engine Kit	10.85	<input type="checkbox"/>

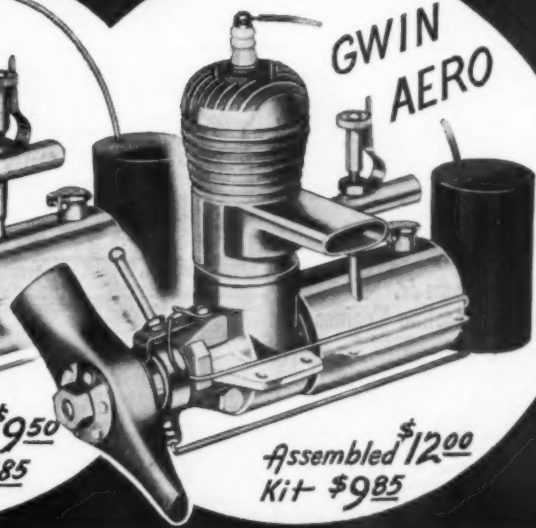
Name \_\_\_\_\_  
Street \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_

MIGHTY  
MIDGET



Assembled \$9.50  
Kit \$7.85

GWIN  
AERO



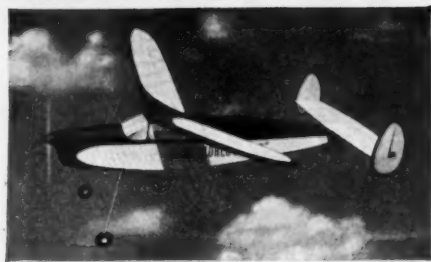
Assembled \$12.00  
Kit \$9.85

# BUNCH

MODEL AIRPLANE CO.

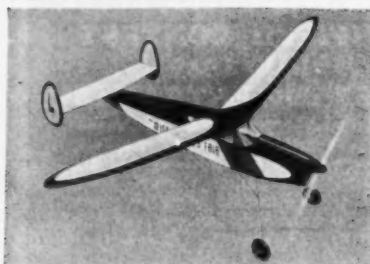
5009 So. Hoover St. Los Angeles, Calif.

# The Handwriting in the Sky spells Scientific Model Leadership



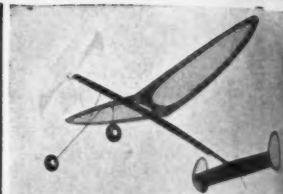
## "MISS WORLD'S FAIR" 30" Wingspan Miniature

The SCIENTIFIC 50" wingspan "Miss World's Fair" went over with such a bang that we have created a miniature of the same model in the 30" wingspan picture here. You will want to build and fly this model plane and keep it as a lifetime trophy to remember the greatest World's Fair of all time. The kit is complete in all detail. Includes many finished parts. Full size plan. Length 20" and flies 3,000 feet. **AT YOUR DEALER 50c**



## "MISS WORLD'S FAIR" 50" Wingspan GIANT

The SCIENTIFIC booth and display at the World's Fair is most popular and the talk of the model world. Maintaining SCIENTIFIC's pace for leadership, we created the new sensational "Miss World's Fair" model pictured here. The hundreds of enthusiastic letters we receive from builders of this new model show words of praise for achievement because many claim as much as three mile flights. . . another step forward has been achieved with simplified plans. The kit is complete in all details. Contains a set of clear, full size plans and detailed directions. KIT IS 100% COMPLETE with 15" machine cut balsa, center drilled propeller, ball bearing washer, all flat parts, ribs, bulkheads, etc., clearly printed on sheet balsa; formed wire parts; streamline wood wheels; liberal quantities of cement and paper adhesive; celluloid for windows; approximately 20 feet of finest quality brown contact rubber washers; tissue; nose plug; celluloid, etc. Flies 1 mile. 50" Wingspan. Length 25 1/2". Weight 6 to 8 oz. **AT YOUR DEALER \$1.50**



## FLEETWING

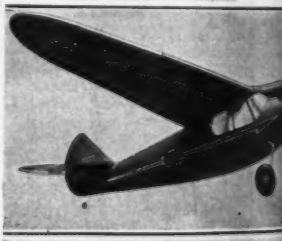
Talk about a sensational! Here's a record breaker with a 38" wing-motor plane climbs at the amazing rate of 600 feet per minute. **Kit complete in all detail and full size plans. At your dealer 50c**



## Red Zephyr Gas Model

Here is lots of plane in every way you look at it. Has 6 ft. wing. Length 56". Weight (less motor) 3 1/2 lbs. precision built. . . most master in performance. . . boasts of industrial record breaking and prize winning flights. Has shock absorbing landing gear. Complete kit (less motor and wheels) at your dealer **\$4.95**

Price including pneumatic rubber wheels. \$5.95



Scientific Kits and Quality Dealers Everywhere

Scientific Model Plane "GAS MODEL PLANE"

218-220 MA-9 Market St.

In England: Model Supply Co., Ltd., London  
In South Africa: Taylor & Francis, Ltd., Johannesburg  
In Portugal: Ed. Von Hatz, Lisbon

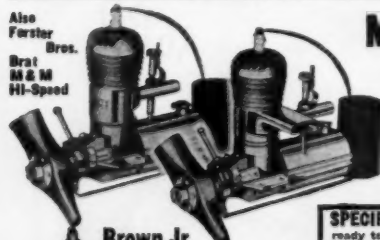


## THE MERCURY Champion of Champions

Your dream for performance becomes a reality in the possession of the extraordinary SCIENTIFIC "Mercury" . . . she has transport speed and grace. She has 6" wingspan. 52 inches long, weight, including motor and ignition unit, 2 1/2 lbs. Climbs 1,000 ft. a minute. Will beat anything you ever saw take off in gas model flying field, regardless of price. **KIT IS COMPLETE** with all necessary materials including a pair of 3 1/2" streamline balsa wheels; shaped prop. blank, all hardware parts; ignition wire; cement; white bamboo paper; giant full size plan with instructions, etc., etc. **AT YOUR DEALER (less motor) \$4.95**

**DE LUXE KIT:** Complete as above, plus the addition of yellow, blue and gold Scientific Dope and a pair of 3 1/2" pneumatic rubber wheels (in place of balsa wheels). A \$1.00 value **AT YOUR DEALER \$6.95**

Also  
Forster  
Bros.  
Brat  
M&M  
Hi-Speed



## Brown Jr. Gasoline Engines

More value for your money! Precision-made in the world's largest and most completely equipped plant devoted to the manufacture of gas model motors. The 1939 Model D includes the sound engineering advances used in other Brown Junior Motors. New and improved timer! New Chrome Molybdenum Crankshaft! New Micro-meter Needle valve! New 1/2" x 1/2" motor shipped ready to run complete with coil and condenser. **\$12.50**



## Mighty Midget Gasoline Engines

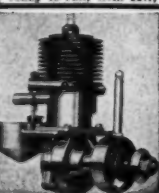
Complete, Ready to Run. Including a True-Pitch Prop., oil, instructive manual and double guarantee.

**Only \$9.50**

### OTHER BUNCH MOTORS

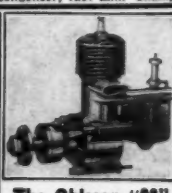
MIGHTY-MIDGET Upright Kit \$7.85. MIGHTY-MIDGET Inverted Assembled \$9.75. MIGHTY-MIDGET Inverted Kit \$7.85. GWIN-AERO Upright Assembled \$12.00. GWIN-AERO Upright Kit \$9.85. GWIN-AERO Inverted Assembled \$12.50. GWIN-AERO Inverted Kit \$9.85. MIGHTY MARINE Assembled \$12.50. MIGHTY MARINE Kit \$10.85.

**SPECIFICATIONS:** All Engines full 1/2 h.p. 8500 r.p.m.; Bore 7/8". Stroke 1 1/2". Bar Weight 6 1/2 oz. Complete, ready to run, with coil, condenser, fuel tank, Champion spark plug, etc.



### Forster Bros.

Bore 1-1/16", stroke 1 1/2", 1/2 h.p., 2 piston rings, wt. 14 oz. Model "P", Air cooled, Bronze Bearing \$17.75. The same with Ball Bearing. \$19.50. Model C Water Cooled, Bronze Bearing \$17.75. The same with Ball Bearing. \$19.50. Prices are postpaid for complete motor including propeller, oil and double guarantee (no prop. with water cooled motors). Fly wheels. \$1.95



### The Ohlsson "23"

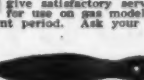
Chock full of Speed and Power. 1/7 h.p. 5/8 bore x 3/4 stroke. \$16.50 p.p. Complete. Ohlsson Gold Seal 1/5 h.p. \$18.50

during the model's adjustment period. Ask your dealer for STAR gas model propellers.



### BRAT ENGINE

Bore 9/16", Stroke 5/8", Height 3 1/4", Weight 3 1/2 oz., complete with coil, plug, propeller, instructions, can of oil. **Price \$16.50**



### STAR GAS PROPS

**STOCK UP NOW!** At these prices you can afford to buy them by the dozen. They will give satisfactory service and are excellent for use on gas models for trial flights and for use on gas models for trial flights and for use on gas models for trial flights.





Ask Your Dealer For

FOR  
HEAVYGAS  
MODELSColors: Natural, Red, Yellow,  
Blue and Green—all brilliant

Ref. from Phila.: "We have run tests on Star Brand AMERICAN BAMBOO PAPERS and find them far superior to any that come from Japan. Panels covered with the paper have been tested for resistance to punctures, with falling lead shots. In every case we had to drop the weights twice as far on the AMERICAN paper as on the Japanese. Furthermore, the new paper presents a smoother surface, dopes nicely and does not have objectionable fibers raised above the surface."



## PROPELLERS

The following types in  
stock:HELICAL  
STANDARD  
BROAD BLADE  
STEEL TYPEMINIATURE  
CELLULOID  
MOTORS4 sizes: 1 1/2"; 2"; 2 1/2"; 3"  
Another Japanese  
Import

These lightweight motors have been designed to our specifications. Every detail of the original radial engine has been accurately reproduced even to the cow plate at the front. They are a distinct improvement over any other dummy motor. At Whitfield's low price, they can be easily included in every flying model kit.

We Pay Shipping Charges  
**WHITFIELD PAPER WORKS**  
76 VARICK ST. NEW YORK CITY

Established 1869

Matthew Smith.....18	Washington, D. C.....14.05
Jordon E. Cain.....19	Hyde Park.....13.48
William Hawks.....17	Philadelphia.....13.06
Bob Christie.....19	Tulsa.....11.36
Edward Swenton.....18	Syracuse.....10.29
Joseph V. Boyle, Jr.....20	Coraopolis.....10.18

## INDOOR CABIN

Open

Joseph Matulis.....26	Chicago.....10.55
Andrew Petersen.....24	Los Angeles.....10.24
James Cahill.....21	Indianapolis.....8.37
Merrick S. Andrews.....25	Philadelphia.....5.26
Roy Wriston.....25	Tulsa.....4.13
Ed. Fulmer.....23	McKees Rocks.....4.11
T. Jeff Harris.....23	Toronto, Ont.....3.35

## INDOOR STICK

Open

Ed. Fulmer.....23	McKees Rocks.....14.34 3/5
Merrick S. Andrews.....25	Philadelphia.....14.32 2/5
Andrew Petersen.....24	Los Angeles.....13.31
James Cahill.....21	Indianapolis.....13.31
Joseph Matulis.....26	Chicago.....12.52
Geo T. Bailey.....21	Akron.....10.59
Ed. Levy.....21	St. Louis.....10.54
Roger Hammer.....21	Newark.....10.47
Jesse Bieberman.....34	Philadelphia.....10.38
John Zaic.....25	New York City.....10.34

## INDOOR CABIN

Senior

John Stokes.....18	Huntington Valley.....14.12
Stanley Stanwick.....17	Boston.....12.17
Harry Lerman.....17	Boston.....11.25
Matthew Smith.....17	Washington, D. C.....11.17
Ted Just.....17	Johnstown.....9.58
Maurice V. Arnold.....20	Columbus.....6.51
Olvie Dague, Jr.....19	Tulsa.....6.35
Walter Hartung.....19	Detroit.....6.00
Irwin Leshner.....20	Philadelphia.....4.26
Ralph W. Brown.....17	Boston.....3.46

## BERRYLOYD FINISH CONTEST

C. H. Siegfried.....	Wichita, Kan.....Berryloyd "Airplane" Trophy
Michael J. Roll.....	Detroit, Mich.....Small Berryloyd "Airplane" Trophy
Joe Raspanti.....	Brooklyn, N. Y.....Small Berryloyd "Airplane" Trophy

## POWER MODEL CONTEST

Class "A" Jr.-Sr.

John Findra.....17	New Brunswick.....66.86	Comet Model Trophy
Leon Shulman.....18	Brooklyn.....28.83	Dallaire Trophy
Arthur Block.....17	New York City.....23.53	Berkley Tro. & Cyclone Eng.
Howard Melin.....18	Galesburg.....20.46	Aero Coil Exchange Award

## POWER MODEL CONTEST

Class "A" Open

Frank Young.....24	Lansing, Mich.....7.06	Bar Aviation Trophy
Chas. Guarnieri.....23	New York City.....1.40	Exch. Awd. & Ever Ready Flash

(Continued on page 56)

**WHEN "SECONDS" COUNT**  
USE FAMOUS **DDXR<sup>2</sup>** SPEED FUEL

**CARBURETOR ACTION**

HIGHER ALTITUDES — LONGER GLIDES  
FOR CONTEST AND EVERYDAY FLYING

**MORE TRACK SPEED**

DEVELOPED ESPECIALLY FOR MODEL 2-CYCLE ENGINES

SEE YOUR DEALER OR WRITE DIRECT  
FOR CAN AND FORMULA

**DDXR SALES COMPANY**  
285 Madison Ave. New York City

DEALERS: WRITE FOR  
ATTRACTIVE PROPOSITION

**1<sup>00</sup>**



**"BOYS-WOULDN'T YOU LIKE  
ONE OF THESE "VIRGINIA FLAGSHIP"  
BEDS IN YOUR ROOM? READ BELOW  
HOW YOU CAN WIN ONE FREE IN  
THE BIG Virginia House MODEL  
AIRPLANE CONTEST"**

**CAPT.  
JOHNNY JONES**

Famous American Airlines  
Pilot and holder of the  
Trans-continental Non-Stop  
Light Airplane Record . . .  
is sponsoring the GREAT  
Virginia House MODEL AIR-  
PLANE CONTEST, and wants  
you to win one of these  
genuine Virginia House  
Maple beds.

**GET COMPLETE  
INFORMATION ON THIS  
BIG CONTEST FROM THE  
LOCAL FURNITURE OR  
DEPARTMENT STORES  
THAT HANDLE VIRGINIA  
HOUSE MAPLE**

**ENTER THE *Virginia House*  
MODEL AIRPLANE CONTEST.. *Your Model*  
*may WIN!***

**H**ERE'S the chance you've been looking for . . . an opportunity to win a truly valuable prize . . . a genuine "Virginia Flagship" bed, made by *Virginia House*. This handsome "Virginia Flagship" suite is as thrilling as a transcontinental flight . . . as beautiful as a perfect three-point landing. Wouldn't it be wonderful to have one of them in your own bedroom? Sure it would. Then don't wait. Enter this big *Virginia House* Model Airplane Contest TODAY. Your model may win the "Virginia Flagship" bed which will be given away in your locality!

This is not a national . . . but is purely a local contest . . . will be judged by local airplane authorities . . . which means that you have a better chance than ever of winning. A beautiful "Virginia Flagship" bed will be given away in each town and city where the contest is conducted.



**Virginia House**

**GENUINE HARD ROCK MOUNTAIN MAPLE**

Created and manufactured by the Virginia-Lincoln  
Furniture Corporation, Marion, Virginia.

**DEALERS IN ALL PRINCIPAL CITIES AND TOWNS—ASK WHO HANDLES VIRGINIA HOUSE MAPLE IN YOUR LOCALITY**

**HERE'S ALL YOU DO**

Find out which of your local furniture and department stores handle beautiful *Virginia House* Maple . . . and which is promoting the *Virginia House* Model Airplane Contest in your own town or city. The store conducting this contest in your locality will give you full information.

**ENTER ANY TYPE  
MODEL YOU WISH**

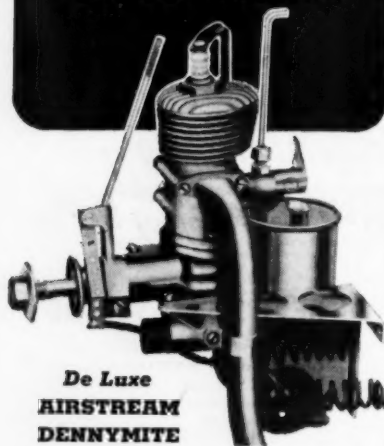
No matter what type of model airplane you own or are building . . . you can enter it in the *Virginia House* Model Airplane Contest.

**CONTEST WILL BE JUDGED  
BY LOCAL PILOTS**

The *Virginia House* Model Airplane Contest in your town or city will be judged by well known local authorities, who are well qualified to pick the rightful winner.

# SOMETHING BIG IS HAPPENING LOOKS LIKE EVERYBODY WANTS AN AIRSTREAM DENNYMITE

BETTER FIND OUT WHY  
ASK YOUR DEALER  
TO START ONE  
YOU CAN HEAR  
THE DIFFERENCE



De Luxe  
AIRSTREAM  
DENNYMITE

## SPECIFICATIONS

Displacement .57 cubic inch—bore 9/10—stroke 9/10  
—1/4 horsepower at 6500 r.p.m.

DE LUXE AIRSTREAM Complete with coil, condenser, Dural motor mounts, De Luxe long exhaust and exclusive spring choke. **\$17.85**  
post paid

STD. AIRSTREAM Complete with coil, condenser and short exhaust stack. **\$15.85**  
post paid

So MUCH more for so MUCH less!

AIRSTREAM UNIT Same as Standard Airstream less coil and condenser. **\$13.85**  
post paid

DEALERS: ARE YOU GETTING YOUR SHARE OF THIS BUSINESS? WRITE FOR NEW DEALERS CATALOG.

**REGINALD DENNY  
INDUSTRIES, INC.**  
5731 HOLLYWOOD BLVD. • HOLLYWOOD, CALIF.

## Frontiers of Aviation

(Continued from page 15)

has not as yet burned up or done any of the other extraordinary things that the "Maid" did in its very smoky lifetime. Capt. V. H. Baker's and Mr. J. Martin's future depends to a great extent on the success of their new enterprise and thus they have taken much care and precaution in the design of this airplane.

The Martin-Baker is a low-wing, full cantilever monoplane with a rigid landing gear that brings back the days of the first Northrops, the Seversky trainers and of course the Delgado. Like the Delgado too is the wing with very little dihedral but of thick chord and short span. As a matter of fact the fuselage is slightly longer than the span. The main feature of this was that with added length to the fuselage enough longitudinal stability would be obtained so as to eliminate the fin, but like most brain storms this idea did not work. Now the plane has a conventional tail and has to carry all that extra fuselage around with it for trying to "go radical."

In the nose is one of those "H" type Napier Dagger 24-cylinder, 1,000 hp. engines which gives a small frontal area and adds to the plane's credit. Undoubtedly the airplane really gets up and goes on the straight-away, but its stub wing tips, which for some reason have also found an existence in this country, prevent the pilot from flying too fast. The oil cooling radiator is located in the leading edge of the landing gear fairing on the left side.

Construction consists of a fuselage of steel tubing partly metal and fabric covered and the wing is steel with dural covering. The ship is fitted with several guns and may be able to hold its own, but before passing further judgment we will wait to hear what the Air Ministry thinks of it.

Clarence McArthur, who was the former pilot of the "Delgado Maid," was unfortunately killed recently when he was forced to jump from a hotel window during a fire, and thus we lose another of the more famous racing pilots.

The month of June which passed not so long ago was a very busy one as far as the airplane designer was concerned, for he had to complete all his designs before July rolled around to enter them in the many competitions that took place that month. There being no finished airplane required to accompany the bid, the various companies spared little conservatism and went "pell mell" into every type of plane called for by the Army Air Corps. Most of the major companies entered at least six of the competitions and we would not be surprised if Douglas entered all of them! Without the enormous expense of building experimental planes the companies were in a position to hire many more engineers and since they did not have to go into the construction of the plane immediately, they were able to put more originality into their designs than is often the custom. The army engineers will have more than one headache deciding who shall get the various contracts in trainers, basic combats, pursuit-interceptors, light and heavy bombers, attack-bombers, observation planes and fighters, for the planes will be closely matched. Frontal areas will be cut down

to very slim margins and speeds will be way above any yet produced in this country. Radial engines, for example, will be completely enclosed. We may see the evolution of the retractable pilot's enclosure for long distance flying on instruments, the use of engine nacelles for storing bombs, the use of four-bladed propellers and the almost complete dominance of the high- or gull-winged airplane and the high mid-wing airplane. All the new flaps and other safety devices will be used. Every new idea that the airplane designer has created in the last few years will be down on paper as the Army Air Corps delves into the mass.

With this new method of contracting for aircraft the manufacturer has taken the attitude that anything that looks like it will work on paper is good enough to enter in the competition and when he gets the order it is then time to worry about its practical application and the production details of the airplane. Let us hope these design features work out in practice as well as they do in theory or otherwise it will be the essence of confusion among the Army Air Corps and the manufacturing moguls.

While on the subject of the design of the airplane in general we bring you words on its tail. For the past year our prominent tail engineers must have been standing on

## NEW 1939 AUSTIN AIRDRAULIC FLIGHT TIMER

NOTE THESE NEW  
IMPROVEMENTS

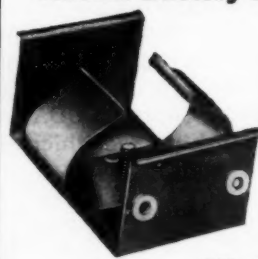


U. S. Pat. Pend.

- Easier adjustment. New design makes possible quicker, more accurate setting for 20 or 30 second motor runs.
- Stronger contact spring. Gives positive contact even under severe motor vibration.
- Stop watch accuracy. The only timer with these exclusive features:
- Adjustable duration from 1 second to 10 minutes.
- Weighs only 1/4 of an ounce.
- The lightest Timer made.
- Only one moving part. Will outlast any mechanical timer.
- Completely enclosed for protection from dust and dirt.
- Oil and Gasoline proof.
- Most dependable timer made. No complicated parts to jam.

- The only Timer to carry an unconditional GUARANTEE against defective parts or workmanship.
- Special instruction sheet with installation and wiring diagram given free with each timer.
- And best of all, the price paid is only \$1.25

## Austin Battery Boxes



These new battery holders are the most practical way of mounting the batteries in your ship. The cells are held securely in place, yet may be quickly placed without soldering any connections. The holders may be shifted for balance adjustment from outside the ship by means of an attachment screw. They hold two cells in series. They are 1 1/4" dia. size, 5/8" dia. size, 40c. Large

now come in all three sizes and weigh only 1/4, 1/2 and 1 lb. Penlite and 1" dia. sizes, 40c. Large 1 1/4" dia. size, 5/8c.

**NEW AUSTIN BOOSTER PLUG-IN CONNECTION**  
A light, inexpensive, practical connection for booster batteries. Any standard lamp cord plug may be used with it. Positive vibration proof contact. Don't take any chances of shorting out your boosters with bare uninsulated clips. Weighs only 1/4 oz. Price only 25c. Ordering: on orders up to \$1.00 add 5c postage. Send for a free copy of our new catalogue. Contains the latest in supplies, accessories, and stuff for gas models.

DEALERS, JOBBERS: Write for information.

## AUSTIN-CRAFT

The leading manufacturer of gas model accessories  
431 E. Victory Blvd. Burbank, Calif.



# Now a Bigger Value Than Ever

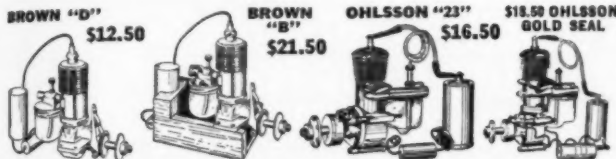
in the

"Gas Buy of the Year"

This is just a partial assortment of our big complete stock of **GAS MODEL MOTORS AND SUPPLIES**

## CLEVELAND CLOUDSTER

Redesigned and Complete, **\$2.50**  
Except Motor Unit, Now Only



NOTE: Include 15c packing charge on ALL ORDERS UNDER \$5.00 except coils and wheels. Everything in stock for immediate shipment.

COMPLETE GAS MODEL KITS INCLUDING LIQUIDS (Except Power Unit)	
6-4" Howard D.G.A.-B. \$12.50	
8-24" Fairchild \$9.95	
4-1/2" Midget Hawk \$3.95	
6-4" Luscombe Phantom \$11.95	
10" Monocoque 90-A \$12.50	
1914" New Taylor Cub \$8.50	
6" Silver Flyer \$6.50	

### GAS MOTORS

All motors listed are ready to run, gastight, and include gas tank, coil and condenser.

OHLSSON "23" \$16.50	
OHLSSON-GOLD SEAL \$16.50	
Brown Jr. Model D. \$12.50	
Brown Jr. Model B. \$12.50	
Brown Jr. Model R. \$21.50	
Synco "ACE" \$13.75	
Synco "ACE" Special. \$9.95	
Synco "BEE" \$12.50	

NOTE: C-D's Dry kits contain full size drawing, covering tissue, printed wood, strip wood, dopes and pneumatic wheels added. Complete kits except Cloudster (as described) have everything the "Wet" and "Dry" kits have plus a liner, battery holder, booster plugs, jacks, hook up wire and a propeller to fit your motor. Select the motor you desire and add to the complete kit price and you will have everything you need for your gas model.



Stinson GP-66 \$8.50  
FLY A "Real Looking" Gas Model Span 82"  
Ideally Suited to Radio-Control Work  
For Which Purpose It's Most Popular in U.S.

CLEVELAND STINSON GP-66

Dry Kit.....\$ 8.50  
Wet Kit.....13.25  
Complete Kit 15.95

### C-D Rubber-Driven Models

KIT DESIGN NUMBER	SP 5/8" SCALE DRY KIT	SP 1/2" SCALE DELUXE KIT	D 1/4" SCALE DRY KIT
1 Gr. L. Sp. Trainer.....	\$1.50	\$2.00	\$1.50
2 T. A. Mystery.....	1.75	2.50	1.80
3 Boeing P12-E.....	1.50	2.10	1.60
4 Sopwith SE-5.....			1.50
5 Bishop's Nieuport.....			1.50
6 Richenbacher Spad.....			1.50
7 Fokker D-7 Fighter.....			1.50
8 Bayley's Gee-Bee.....			1.50
9 Howard "Dela".....			1.50
10 Supermarine SE-5.....	1.75	2.25	1.65
11 Hawk P6-E Fighter.....	2.25	3.00	1.85
12 Doolittle's Gee-Bee.....	1.50	2.10	1.60
13 Monocoque Sport.....	1.50	1.95	1.50
14 Boeing P4B-1 Fight.....	2.50	3.50	1.95
15 Boeing 247 T.....			1.95
16 Howard "Dela".....	1.50	2.25	1.65
17 Douglas C-38 OBS.....	2.50	3.50	1.95
18 Martin Bomber.....	1.50	2.00	1.50
19 Laird Solution Racer.....	1.50	2.00	1.50
20 Wedell's W. Wms.....	1.75	2.50	1.60
21 Turner's W. Wms.....	1.75	2.50	1.60
22 Curtiss P11C-2.....	2.50	3.50	1.95
23 D. H. Comet Racer.....	1.75	2.50	1.60
24 "Mr. Mulligan".....			1.50
25 Douglas Transport.....	2.50	3.50	1.95
26 Boeing P26-A.....	2.25	3.00	1.85
27 Seversky P35.....	2.25	3.00	1.85
28 Custom Waco C6.....	1.50	2.00	1.50
29 Beechcraft C-17-B.....			1.50
30 Lockheed Electra.....	1.50	2.00	1.50
31 27 Fokker Racer.....	1.75	2.50	1.60
32 Turner Laird.....			1.50

Be Luxe sets also available for D-35, D-45, D-65 at \$3.75 each. D-55 at \$3.25.

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Contains 3 great lines of C-D airplanes, also 5c gliders and 10c and 25c airplanes for beginners and larger ready-to-fly models. Also model railroad equipment and toy trains, 10c up in 0, C-D, 00 and HO gauge; a wide variety of gas model airplanes and all well-known makes of gas engines; gas and "rubber driven" supplies; also "general" supplies for railroad and innumerable model uses; authentic 10c, race cars, hand tools and power machinery, fine cameras, telescopes, microscopes and a wide variety of ship kits and fittings. Nearly everything a real model builder could wish for within its pages for only one thin dime. Send for it today!

Only 10c

ROBERTS' MILLER SPECIAL Kit AU-1  
4 1/2" - Red, Nose Black, White Numbers

JOHNNY SNYDER'S SPARKS SPECIAL Kit AU-2  
4 1/2" - Dark Blue with White Numbers

DAW - OFFENHAUSER SPECIAL Kit AU-3  
4 1/2" - Green, Red Trim

### INDIANAPOLIS RACERS!

While there are many hundreds of internationally known race cars, including 3 Indianapolis winners (No. 1, No. 2, No. 3) which anyone may select to model, we have taken these six as the first of a series we shall produce, but will others duplicate these very same ones! Just watch for leadership in this field. Kits are absolutely complete except for colors, which means they contain the following: body block, cut to size, authentic scale size (not top) wheels, axles, printed steering wheels, strips for bulges, exhausts, fenders, etc., and on top of this all, even tires. Order by number and name to avoid confusion. Each only.....\$1.00

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Austin (European) 4 1/2" Kit AU-4.....10c  
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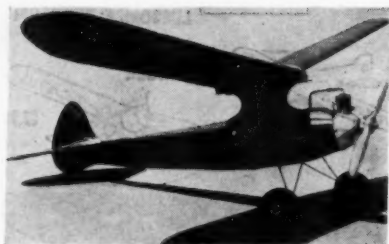


SAY FELLOWS:

FOR MANY MONTHS A BATTLE HAS BEEN RAGING BETWEEN MODELRAFT AND GRAVITY AND IT LOOKS LIKE MODELRAFT HAS WON. HERE IS THE RESULT - *THE MODELRAFT INTERCEPTER*, FASTEST CLIMBER OF THEM ALL! UNDESIRABLE CHARACTERISTICS COMMON

IN ALL MODELS OF THIS TYPE HAVE PREVENTED US FROM RELEASING IT SOONER-BUT WHEN MODELRAFT ENGINEERS ADAPTED OUR NEW STABLE AIRFOIL, WE ELIMINATED THE TENDENCY TO PORPOISE ALL OVER THE SKY. BE CAREFUL WHEN YOU FLY YOUR NEW *INTERCEPTER*, SHE'S A FAST CLIMBER, BETTER TAKE ALONG THE FAMILY SHOT GUN IF YOU WANT TO GET IT DOWN AGAIN. YOU'LL THINK YOUR SHIP HAS CAUGHT THAT PROVERBIAL SKY HOOK MODEL BUILDERS HAVE BEEN TALKING ABOUT.

*Barney*



### MODELRAFT INTERCEPTER

Built to Get Up There  
and in a Hurry!

#### SPECIFICATIONS

Wing span 46", chord 7", flying weight 23 ozs.  
Kit contains: formed landing gear, beveled trailing edge, spun aluminum cowl, printed balsa parts, extra select gas model balsa, full size detailed plans showing both radial and beam type mounts, plenty of bamboo paper, cement, dope, complete test flight instructions and gas model air wheels. Kit.....

**\$2.95**

POST PAID

Plans only.....25c

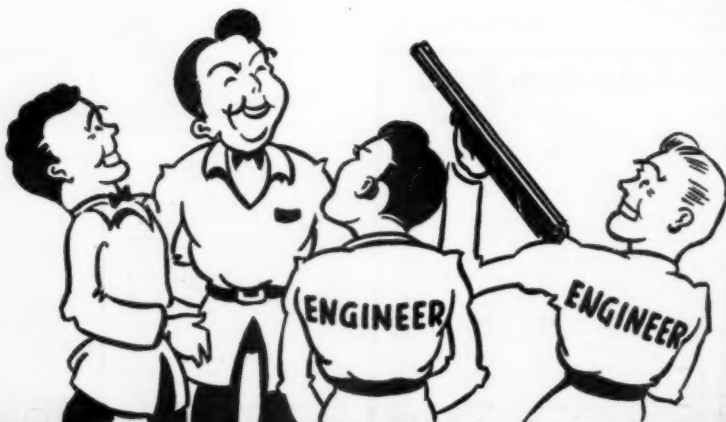
#### COMBINATION OFFER:

Interceptor Kit and Engine (choice of Ohlsson "23" or Torpedo) with prop to  
fit engine included only.....

**\$18.95**

POST PAID

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# ★ MODELRAFT ★

THE LEADING SUPPLY HOUSE OF THE WEST ★ 7306 SOUTH VERMONT AVENUE, LOS ANGELES, CALIF.

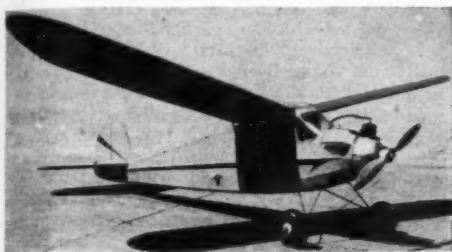


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Stock up now—carry plenty of extras in your tool box. Complete range of sizes, 9", 10", 11", 12", 13", 13½", 14". Due to the enormous demand, Modelcraft has doubled their original equipment and now operate 2 machines for building the finest, most efficient props in the country. Buy from your dealer or Modelcraft.

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***Meet this New Flying Sensation***

## MODEL CRAFT'S SKY BABY

Here is the first of our 1940 ships—climbs like a sky rocket—but, more important, it stays there.

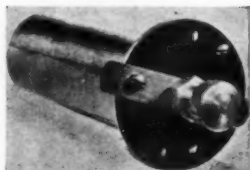
Designed for Ohlsson "23", Torpedo, Hi-Speed, Cyclone and Bunch engines, etc. The SKY BABY was developed especially to meet the new 20-second engine run contest requirements.

## SPECIFICATIONS

**FLYING WEIGHT WITH OHLSSON "23"—27 ozs.**  
Wing span 54"—Wing area 360 sq. inches. KIT CON-  
TAINS spun aluminum cowl, air wheels, cement, dope,  
formed landing gear, colored gas model paper, printed  
ribs, select balsa, enlarged full size plans. **\$3.85**

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**PLANS ONLY 25c**



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## OHLSSON



**GOLD SEAL**

**SPECIFICATIONS**  
Horsepower 1 1/2, Bore  
7/8", Stroke 1 5/16",  
500 to 10,000 r.p.m.  
.....\$18.50 Post Paid



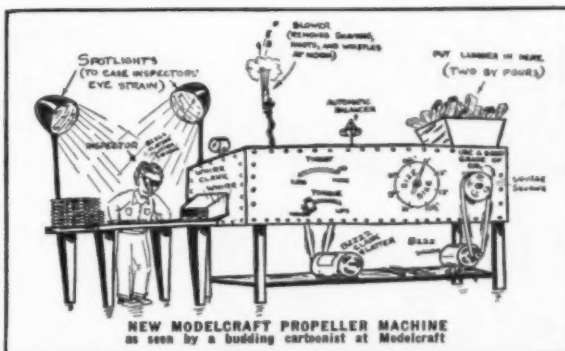
### MODEL "23"

Choke-full of power,  
speed and stamina!  
**SPECIFICATIONS**  
Horsepower 1/7.  
Bore 5/8". Stroke 3/4".  
Bare weight 4 1/2 lbs.,  
Height 3 9/16".  
.....\$16.90 Post Paid



## TORPEDO

Displacement .30 cu.  
in. 1/8 H. P. 8,000  
r.p.m. with **\$16.50**  
12 in. prop.... **Post Paid**



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## SPECIFICATIONS

A pocket edition of the Pacific Ace, 46" constant cord wing. For Ohlsson 23, Phantom and other  $\frac{5}{8}$ " engines. Wing span, 46". *De Luxe Kit* contains spun cowl, silk,  $2\frac{1}{2}$ " Voit Air Wheels, cement, dope, die-cut ribs, plenty of good balsa, and full size plans. Price **\$3.95**

STANDARD KIT same, but with bamboo paper covering.....	<b>2.95</b>
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**DRY KIT** complete except for wheels,  
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PLANS ONLY 25c



### 1939 PACIFIC ACE GAS MODEL

66 in. tapered wing. DE LUXE KIT contains tapered spars, beveled and tapered trailing edge, die-cut ribs, turned aluminum cowl, 1 qt. gas dope, 1 pt. cement, 3 1/2 yds. super silk, formed landing gear, 4 1/2 in. inflatable air wheels, dural wire, alum. tube, washers, bolts, haskalite, dural sheet, hook up wire, switch, selected hard balsa, full sized, black and white. **\$8.50**  
plans with test flight instructions, complete.

**STANDARD KIT** with bamboo paper, 1/2 pt. of dope,  
1 pt. of cement and 3 1/2 in. air wheels..... **6.25**

**DRY KIT** same as above without cement,  
dope, silk or wheels..... **4.75**

PLANS ONLY 50c

# ★ MODEL CRAFT ★

**THE LEADING SUPPLY HOUSE OF THE WEST ★ 7306 SOUTH VERMONT AVENUE, LOS ANGELES, CALIF.**

# BUD WARREN Says:

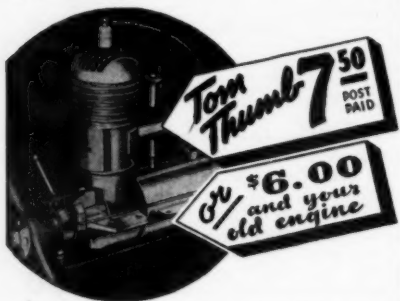
"I still have the world's biggest value" the Tom Thumb 1/5 h.p. gas engine



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## SPECIFICATIONS and HOW to BUY the NEW TOM THUMB

The Tom Thumb is the most powerful easy starting 1/5 H.P. engine made. Clip the coupon below, enclose money order for \$7.50 (also your old motor for special \$6.00 offer), and receive a brand new assembled and block tested Tom Thumb. Complete with fuel tank, coil, Champion spark plug, one piece cylinder and head and other modern features. Complete flying weight 10 oz. (less batteries). Bore 7/8"; Stroke 3/4".



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☐ Rush me one new Tom Thumb Engine. I enclose \$7.50.

☐ Rush me one new Tom Thumb Engine. I enclose \$6.00 and my old engine (any make) including all parts regardless of condition.

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☐ Upright ☐ Inverted

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their heads or have been afflicted with an epidemic of surrealism, for even the French designers have not been able to create such abortions. We have in mind such planes as the new Boeing Clippers, the Consolidated Model 31 that was just completed, a couple of those attack-bombers that entered the last competition and last but not least the DC-4.

As far as the tail on the Consolidated is concerned, it may just be a matter of taste for undoubtedly it does work efficiently and we have heard many designers that do not work at Consolidated say they like the tail, mind you. It is undoubtedly simple to manufacture and its stub tips have aerodynamic merit, but nevertheless we think great improvements could be made in its design to coincide with the very clean lines of the rest of the airplane. As for the other ships with their tails we will just mark them down as sad cases. For a beautiful ship that proudly thrusts her nose through the air and flies so gracefully as does the Douglas DC-4 it is a shame that it is made to cart all that mess of superstructure around with it.

The multi-rudder tail offers many possibilities for efficient and graceful designing, and it is unfortunate that the American designers have murdered its good features. With anticipation we wait to see the forthcoming military ships remedy this trend.

Stinson surprised the world when it gained a large order for observation planes from the U.S. Army Air Corps to make the company a prominent warplane builder overnight. The contract totaled \$1,500,000 for an unspecified number of airplanes. Two of its competitors, Bellanca and Ryan, received \$50,000 each for honorable mention. The Stinson airplane is an entirely new design that the company has been working on for some time. It is said that the airplane is of the short-range observation type especially adaptable for work with infantry units.

Other prominent sportplane manufacturers that have already begun to reap harvest from the present armament program are Waco, St. Louis Car Co., and again Ryan is mentioned. This time it was for trainers with orders for about thirteen ships going to each with an additional thirteen probable in the near future. This new plane of Waco's we hear still retains the biplane feature. The St. Louis Company has spent many years with the thought that it might get a military contract and details of their airplane should be interesting when disclosed. Ryan won her share with a slightly revamped version of its ST low-winged ship.

We made it rather obvious in past issues that we liked the Douglas twin-engined attack-bomber very much and it was good news when we heard that Douglas won the competition against such competitors as Martin, Stearman and North American. It was somewhat of a surprise when they copied the \$15,000,000 order after it had been thought that they were eliminated by the crack-up of their plane. However we think the Air Corps picked the right airplane and we are now awaiting to see the first of the planes come out the doors of the new huge assembly building just completed at Douglas's El Segundo plant. (The big surprise may be though that it will come

out the doors of the Douglas Santa Monica Division, for the former Northrop plant in El Segundo may have enough to do in building experimental planes. We hear Douglas has a small single-place fighter in the completion stage.

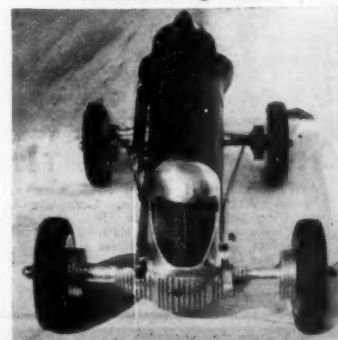
According to Secretary of War Johnson, the new Seversky YP-43, of which thirteen are now being built, will do over 350 m.p.h. The order totals \$974,324. Major Seversky has resigned from the company bearing his name, and thus we may see a new trend in design of Seversky aircraft with a new chief engineer at the helm.

North American Aviation, Inc., came out victorious in a competition for basic combat ships in which Vultee placed a close second. North American's entry is a much advanced design over its former BC-1 and is practically identical to the BC-2 type that has been delivered to the Army Air Corps. Vultee's airplane is small but of the same general design. It is of all-metal construction, and Vultee had felt rather certain, we hear, of winning. North American's contract amounted to about \$2,500,000 for approximately 100 planes and Vultee's amounted to \$90,000 to pay for experimental costs and the purchase of test ships. Vultee at the present moment has high hopes of establishing a record backlog by way of the July army competitions. They have hired very many engineers and are at work on several "super" designs.

It was only a lapse of ten months from the time that the Consolidated Model 31 was originated to the time when the first test ship took off on its maiden hop. The Model 31 is Consolidated's latest twin-engined flyingboat, and it boasts of a gross weight of 25 tons. The wing loading figures close to 45 lb./sq. ft. Douglas's little twin-engined attack bomber has a wing loading of 30 lb./sq. ft. which was considered the highest of any airplane in production.

The Fowler flap was first made popular by Martin without much success until Lockheed picked it up and designed the Model 14. The success that Lockheed has had with them and that which Consolidated undoubtedly will have may entice more manufacturers to use them. The flaps on the Model 31 are hydraulically operated.

## C. A. R. Miniature Midget Racer

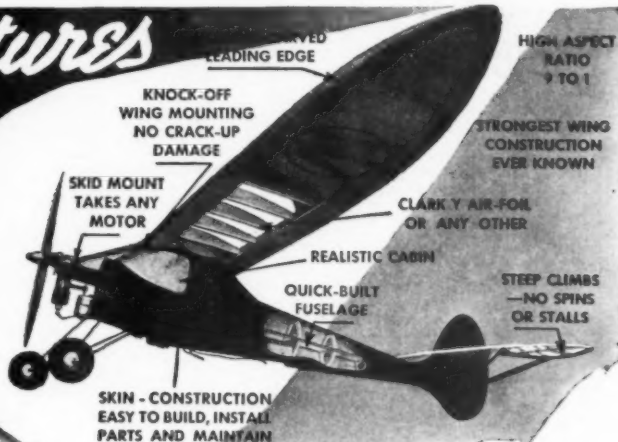


I am a Real 14" Wheel Base Racing Car. 1914" all Metal construction. My experienced builders overlooked nothing. So I Ride the Banks, the Dirt, or Flats, safely and very fast. Roller Needle Bearing Gear Driven. (Spintur wheels.) Send 25c at once for Full Details.

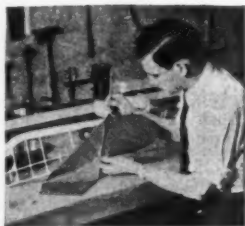
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12" x 12" . . . . .	.32 .15
9" x 12" . . . . .	.23 .10
9" x 12" . . . . .	.18 .10

**SOLVENT:** ½ oz. 5c. 1 oz. 10c.

## MEGOW'S KWIK-DRI CEMENT

Quick, firm-gripping, transparent, water-proof. Easy to use. Tubes . . . 5c and 10c. Larger sizes in bottles and cans. Prices listed in Catalog.



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Same as used on big planes. Fine quality, brilliant, smooth-flowing, quick-drying. Dense rich colors can be thinned to 50% and still have great coverage. Fine for spraying. Sizes from 5c up. At your dealer's or send for color card.



Models like these can be built only with Megow kits. Without Megow's hollow-carved and finished Leading Edge and structural design, even the most expert builder working many days could scarcely build a wing half so strong and beautiful. Without the Megow monocoque construction such strong, slender streamlined fuselages would be beyond the skill of the average builder. The skin construction of this fuselage permits easy installation of parts, and the skid mounting takes any motor . . . saving still more time and tedious work. With their high aspect ratio, steep climbing ability, extremely flat glides that take advantage of every thermal, these new models become ideal for contest purposes.

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Wingspan 6 ft. Stabilizer span 29½". Wing area 570 sq. in. Uses any ¾" bore motor. 3½" streamlined rubber wheels. Price . . . . . \$4.95  
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Wingspan 51½". Stabilizer 18½". Wing area 276 sq. in. Uses any ¾" bore motor. 2½" streamlined rubber wheels. Price . . . . . \$3.95  
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Cub  
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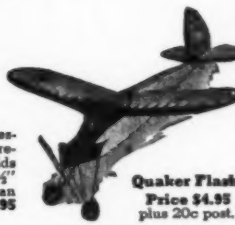
Designed by Maxwell Bassett especially for Megow's. Ready-to-use prop., all metal parts die-cut, spec. rubber wheels. Uses any ¾" motor. Span 48". Length 29½". \$3.95 plus 20c postage.



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### World Champion QUAKER FLASH

Cut-out prop., ex. hard balsa wood, sheet aluminum for cowl and all necessary supplies. Wings removable and gear folds back for carrying. 3½" puncture-proof wheels. Span 67". Length 47". \$4.95 plus 20c postage.



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## NEW CLASS C ENDURANCE CONTEST MODEL

Rubber-Powered Aerodynamically perfect, yet easy for the average builder. Everything intended to increase glide . . . folding prop. avoids resistance when power stops, wing streamlined into fuselage, thin wheels, all-wire landing gear (folds back to pack in small box), streamlined tail section. Rubber tensioner prevents shifting weight of unwinding rubber. Meets all N.A.A. specifications. Kit complete with rubber, plans and all supplies. Span 41". Wing area 147 sq. in. Wing chord 3½". Aspect ratio 12. Weight 4.23 oz. \$1.50 plus 15c postage.



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3/32x1/2 12 for 5c	
3/16x3/16 8, 5c	
3/16x1/2 6 for 5c	
3/16x1/2 3 for 5c	
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1/16x2 8 for 10c	
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## TERY.

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## 50c value 30c

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## 3 ft. 10c

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## Each 5c

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## Packing cost on all orders 10c, 35¢ or 5 ft. 10c extra.

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## Transocean Flying Boat Dornier Do 26

The most important problem of the present day in the transatlantic airmail service is the development of an aeroplane which is capable of covering rapidly, safely, reliably and without intermediate landings, the approximately 5600 kilometer journey between Lisbon and New York, which is known for its bad weather. According to the existing state of the aeronautical art, the most favorable conditions for the accomplishment of this object are provided by the flying boat. The four-engine transoceanic flying boat Dornier Do 26, a 20 ton flying boat suitable for catapult launching, has been developed for the direct North Atlantic airmail service of the Deutsche Lufthansa and fulfills the existing requirements. The Dornier Do 26 is a flying boat with the qualities of an excellent landplane.

Since the Do 26, a cantilever semi-high-wing aeroplane of 30 m. span is normally launched by a catapult from the mother ships of the Lufthansa and lands on the water only in an emergency, this type has been purposely designed without the lateral stabilizing fins otherwise representing a well-known feature of the Dornier boats, and for the first time in the history of German flying boat design there has been applied to the boats the principle of the retractable undercarriage, the floats being retracted into the interior of the wing when the machine is in the air. The strictly aerodynamic design of the entire machine reacts favorably not only on the speed but also on the radius of action.

The all-metal body of the boat with two steps is subdivided by 8 watertight bulkheads. To satisfy transoceanic requirements, the boat is divided into a bow compartment for the marine equipment, a mail and freight compartment, a spacious pilot's cockpit, a wireless and navigation compartment, a tank compartment, a second mail compartment, a large resting room for the crew, a lavatory and a washroom. The boat itself offers very little resistance to the air and closely approaches aerodynamic perfection. The three-part wing comprises a rectangular V-shaped centre section projecting directly from the body of the boat and carrying the two slender engine nacelles. The ailerons and the landing flaps are disposed behind the edge of the wing.

The tail unit comprising an elevator and a keel fin with pivoted rudder is situated at the stern of the body. Elevator and rudder are compensated aerodynamically and in weight.

There are 4 Jumo-Diesel engines arranged in tandem in two engine nacelles. Whereas the two tractor screws are driven by the engines direct, the two propellers receive their drive by way of an extension shaft. To prevent damage to the propellers by spray, a new design has been adopted insofar as the rear engine and propeller are so constructed that upon starting they can be rocked upwards to the extent of 10 degrees. Trials have shown that the flying boat is still capable of flying without loss of altitude even in the event of failure of any two engines. The bottom portion of the boat itself forms a tank in the vicinity of the centre of gravity, a principle of construction also employed for the first



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## Old English CEMENT

The engines turn three-bladed Hamilton-Standard Hydromatic full-feathering propellers of 16 feet diameter.

Wing span: 110 ft.

Length: 73 ft.

Height: 22 ft.

Max. wing chord 14 ft.

The aspect ratio of the wing is 10 which was unbelievable a few years ago for high speed aircraft. Of full cantilever design, the wing contains integral fuel tanks and has a flush riveted skin. Wing floats are raised up under the wing when the boat is in flight.

The company states that the Model 31 surpasses their Navy PBV boats in range, speed and load. Thus it also has prospects of being a part of the Navy's air force. Incidentally 209 Consolidated PBV flying-boats have been delivered to the Navy since their origination.

Another new feature of the Consolidated is the use of a hydraulically retractable beaching gear. The nose wheel is housed in a well in the bottom of the hull and the side wheels swing upward into wells in the side of the hull. The side wheels are removable as well as retractable.

The Vought single-float seaplane which goes under the heading of the Vought-Sikorsky OS2U-1 is now in scheduled production. We first mentioned this plane in MODEL AIRPLANE NEWS over a year and a half ago when the basic design of the ship was being proposed. A fleet of them are now under construction for the navy. They are of the single-engined, mid-wing type equipped with the new N.A.C.A. slotted flaps.

In the racing field the latest Folkerts has been test flown and should be one of the leading contenders at the forthcoming National Air Races. It is of the same general Folkerts design.

It is now reported that Marion McKeen will install the old wire-braced wing on his "Miss Los Angeles" again and Lee Williams will be the pilot.

They say Mr. Israel's, the old racing pilot designed the new Stinson spotster.



## COMPLETE KIT

\$5.

ASSEMBLED  
\$10

Everything is in the kit including Champion spark plug, Winston coil, condenser, tank and cap, ignition wire, cylinder, piston, connecting rod, timer, crankshaft, all screws, nuts, bolts, complete instructions, etc. Every part is fully machined and finished. No oil, gas, batteries, or propeller included. A SCREWDRIVER IS THE ONLY TOOL YOU NEED.

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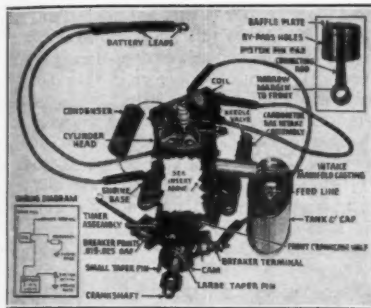
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The new 1939 model now for sale includes the new unbreakable steel stamped piston giving high and perfect compression, drop forged one-piece crankshaft, self oiling "Ledaloy" bronze bearing, etc.

## SPECIFICATIONS

4 Port 2 Stroke Cycle.  $\frac{3}{4}$ " Stroke.  $15/16$ " Bore. 300-7000 R.P.M. Turns 14" Prop. 8" Pitch. Bearing Surface,  $1\frac{1}{4}$ " Long. Crankshaft,  $5/16$ " Diam. Weight, 10 oz. (Motor) Rotation, Either Direction. Height,  $4\frac{1}{2}$ "—Width,  $2\frac{1}{2}$ ", H.P. Approx. 1/5th.



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R. P., Hamburg, N.Y.—"I want to extend my personal thanks to G.H.Q. for their prompt service. The motor I ordered was received within 24 hours. Such service cannot be surpassed. I also want to say that I have the motor running perfectly. I shall do all I can to help promote the success of G.H.Q."

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We carry all the BEST MOTORS, KITS and SUPPLIES  
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No matter how efficient your ship or how powerful your motor, your ship depends on an efficient prop to 'get up there.' Now, for the first time, gas modelers are offered a scientifically designed and properly balanced propeller in the size and pitch to conform with any ship and motor combination. These are hardwood, lacquer finish props and are priced with the lowest.

9" diameter	6" or 8" PITCH	only .40
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12" diameter		only .45
13" diameter	6" - 8" - 10" or 12" PITCH	only .50
14" diameter		only .50
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When ordering be sure to state diameter and pitch desired. If in doubt as to the correct size, tell us the kind, size and weight of your ship and the kind of motor by which it is powered and we will supply you with the right propeller for peak performance.

We have an interesting sheet describing these props, along with a prepared table for selecting the correct size and pitch for any gas model. We will be pleased to send you a copy on receipt of your request accompanied by a stamped, return envelope.

Orders for \$1.00 or more shipped postpaid SAME DAY. Send your order to us for any kits or supplies advertised by Peerless, Comet, Magway, Bura, Berkeley, Denny, Aircraft, Scientific, Onison, Modelcraft.

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### MR. LUNDGREN WRITES:

BURD PISTON RING COMPANY,  
Rockford, Illinois

May 10th, 1939

International Models Co.,  
251 W. 55th St.,  
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Gentlemen:

I wish to thank you sincerely for the courtesies extended to me during my recent visit with you, and assure you that it was very interesting.

In reference to my G-9 motor, I want to say that I had an opportunity to put it through some very severe tests. After properly adjusting the needle valve according to your instructions I started up the motor and was very surprised to find it started immediately.

We also found that we were getting more power out of this motor than any of the others that I had had the opportunity to test. I want to assure you I am very much satisfied, and look for some excellent performance from this engine. I want to compliment you on its design and construction.

Very truly yours,  
(signed) A. A. Lundgren,  
Vice President.

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**POWER THRUST 10,000 R.P.M. VERTICAL INVERTED HORIZONTAL**

**SPECIFICATIONS:** Wt. bare 9 oz. Bore 7/8". Stroke 13/16". R.P. 1/2" plus. R.P.M. 300 to 7000 with 13" prop. up to 10,000 with 9" wheel. G-9 will outperform engines selling up to \$30 ON A MONEY-BACK BASIS! There is none finer made at any price—it's magnificent value!

time. The fuel is located in four compartments separated by bulkheads.

Span: 30.00 m. Length: 24.50 m. Height: 6.85 m. Wing area: 120 square meters. Flying weight: 20000 kgs. Maximum speed: 335 km.p.h. Travelling speed: 310 km.p.h. Landing speed: 110 km.p.h. Radius of action: over 9000 km.

### Streamlines

(Continued from page 20)

urally, on an endurance model any such important factor cannot be overlooked. Another specific problem is caused by two airfoils in close proximity (Picture No. 14). The flow tends to leave the inner surfaces, causing a force about four times as great as with one surface alone. This comes into effect chiefly at wing and fuselage connections. For this reason, wings should be cut in as much as structural strength will permit, so that effect will be as small as possible, and then carefully filleted.

It is impossible to do anything in three dimensions on airplanes, but car profiles afford interesting pictures not so far removed from our work. The Model T shows pressure in front, twirls around the windshield, and tremendous vacuum in the rear. (Picture No. 15.) If speeds had ever been high, it would have paid to tow a trailer around all the time, as the decreased drag would have been a great saving (Picture No. 16). We are still far from perfect in our automobile shapes (Picture No. 17), but it is probable that the structural difficulties of designing and producing a true streamlined car will make us keep to present lines for a while at least.

### Lift

Usually the forces on an object are not simply drag. On a flat plate, for example, the general rule is that the force acts perpendicular to the plate. If the plate is at a slight angle, this force is back and upward, and by the parallelogram rule may be resolved into two forces, lift and drag. They are tied up with other forces making a more complicated pattern, but at present we are only interested in showing how they are produced.

On a flat plate the lift is derived chiefly from the pressure of the air on the bottom surface (Picture No. 18). Or, another way of looking at it, the lift depends upon the amount of air displaced downward. The vacuum on the top helps considerably but is chiefly drag. Recently a new theory for lift has been developed. It depends upon a theory in physics that the sum of energy in

a system is constant. That is, if the speed at one point (kinetic energy) increases, the pressure at that point must decrease. Examining any of the thick streamlines shows that the airflow speeds up along the sharply curved points. Since a streamline is symmetrical, pressure on top and bottom balances each other. But cutting a streamline in half leaves normal pressure along the flat and decreased pressure along the top. This means that the section will lift at 0 angle; something that a flat plate will not do. Since this shape would have a high drag, we round off the nose, leaving a Clark Y section (Picture No. 30). Changing the angle increases the drag and the differential between top and bottom speeds (hence, lift) until the section stalls (Pictures 31 and 32). That is, air twirls around pretty generally, ruining everything. The Clark Y is a good average section. It may be varied in many ways. In general, making it thicker increases the lift at the expense of greater drag. Hence thick sections are usually found on slow flying gliders and models. Also, increasing the under camber increases the effect first noticed with a flat plate, making a greater downward flow of air. An Eiffel 431 shows this effect moderately and is an excellent model section. (Pictures 27 and 28). It has one defect in that it stalls at a low angle (Picture No. 29). Increasing the under camber to the extreme we have a single surfaced airfoil. One of the best of these is the McBride B7 shown (Picture No. 19). This was high lift and a high stalling point (Picture No. 21), but is hard to work out structurally. It also shows excess lift at low angles due to the air twirling under the nose (Picture No. 20). We may get around these difficulties by changes as in the S11, an original airfoil (Picture No. 25). The dip in the nose reduces the drag at low angles and allows a strong leading edge (Picture No. 24). This is proven by flight tests to be one of the best of model airfoils (Picture No. 26).

There are a number of variations in indoor sections. Moving the hump farther forward produces a higher lift at the expense of greater drag (Picture No. 22). Also, turning up the trailing edge produces some interesting results (Picture No. 23). In the first place, it produces a more stable section. Notice that on other airfoils (B7, for example), as the angle increases, the region of rapidly flowing air on the top is moved forward. This means that the lift is moving forward, which tends to stall the model. Decreasing the angle tends to pro-

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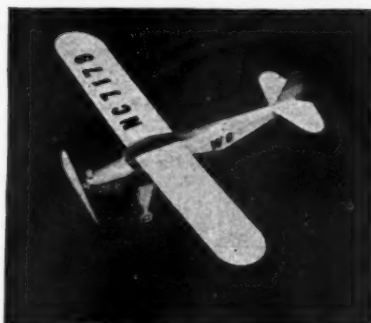
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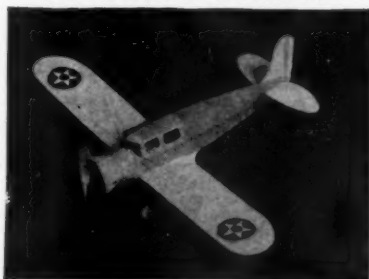


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duce a dive, a very unstable situation. Turning up the rear holds the air down all along the surface—keeping the center of pressure practically constant. Another thing is that this prevents a stall. All in all, this seems to be a very promising section and worth further experimentation.

Going in the other direction, and dipping down the lower surface toward a streamlined shape, we come to a new type of airfoil—the so-called streamlined airfoil (Pictures 33 and 34). As they are nearly streamlined, the drag is low, but the lift is also low. These have a very high efficiency and a high stalling point, (Picture No. 35) but model builders are, as a rule, making a mistake in using them, because the increased speed necessary to lift the model so increases the overall drag (including body, etc.) that the total efficiency is very much less. The sections were intended for use on high speed transports and racers where speed is at premium. Their only use on present models is on tail surfaces where their high stalling point and steep fluctuations of lift make them very valuable. The new rules requiring a twenty second gas model motor run do put a premium on speed, and since the light models used will probably go up on the prop, there's a possibility of using them here.

This fairly well covers the field of airfoil except for the mechanically changeable ones. It is possible that as soon as structural difficulties have been overcome these will prove to be very valuable. The most valuable at present incorporates the wing slot (Picture 38; compare with Picture 32). At low speeds the slot is closed, making a normal airfoil. At high angles decreased air pressure moving forward opens the slot. Its shape forces air down along the wing, delaying the stalling point until later and hence allowing the ship to climb at a much steeper angle.

In review let us say that streamlining is of utmost importance. FIRST—Bodies should, if possible, be plotted to some known profile section and the cross-section should, if possible, be a tear drop to decrease drag in a climb. SECOND—Wing connections should be made as small as possible and carefully filleted. THIRD—The best airfoils for endurance models are of high under camber, the higher the better as far as structurally possible. FOURTH—An upturned trailing edge is valuable to increase stability and stalling angle. And FIFTH—Streamlined sections are excellent on tail surfaces and possibly on new twenty-second motor run gas models.

## Make Your Own Airflow Analyzer

If you are interested in experimenting on your own, or in making an excellent aviation demonstration piece, try this easy device. Carefully build a 2" high frame of 2-1/4" x 1/2" white pine around a 30" x 18" plywood panel. Cut out two strips 1-1/2" high x 1" wide x 22" long. Round the ends and nail in place to separate the working chamber from the return channels. Bend 1-1/2" wide strips of tin into concentric circles as indicated. These are best soldered to a tin sheet to be mounted, but may be mounted in putty. Putty all joints so there are no leaks. Make an 8" wide paddle wheel about 5" in diameter and mount in one end so that it just misses the



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**THE FIRST MAJOR IMPROVEMENT ON TWO-CYCLE MOTORS IN 60 YEARS**  
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RECOMMENDED PROP  
 11½"x3" PITCH

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We appreciate the great response you have given our .292 piston valve motor.

Due to the demand, it will be necessary for us to fill all orders in rotation received.



Fully Covered by Pend.-Pat.

## Check These Exclusive Features Found Only In The M & M .292

### MORE POWER AT SLOWER SPEEDS

It is not necessary to run this motor at burn-out speed to develop power. The slower the motor speed, the less wear on the motor.

### 400% MORE PISTON SEAL

Only motor with full length piston seal (holds compression better).

### ROTATING PISTON—PERMITTING EVEN CYLINDER WEAR

It is impossible to hold compression with an egg-shaped piston and cylinder.

### NO LOSS OF POWER WHEN MOTOR IS HOT

Due to even piston and cylinder expansion and even wear.

### ONLY MOTOR WITH FULL LENGTH CYLINDER COOLING FINS

Adds strength and resists damage in event of crack-up.

### SPECIAL DESIGNED CAST IRON PISTON AND CYLINDER WITH CENTRAL INTAKE PORT AND CIRCUMFERENTIAL EXHAUST

Permitting quicker fresh gas intake and rapid disposal of burnt gases. This also adds more power.

### PERFECT STREAMLINING

MOST POWERFUL MOTOR IN THE N.A.A. .30 CU. IN. DISPLACEMENT CLASS

### FULL TUBE CARBURETOR NEEDLE, WITH MICRO-GAS ADJUSTMENT

No threads or pin holes to get clogged or damaged. It can be easily taken apart for cleaning.

### TOTALLY ENCLOSED POINTS

Special designed case. Impossible for bearing or cylinder oil to foul contacts.

### OTHER FEATURES

TRANSPARENT GAS TANK which can easily be filled through hole in cap. Tank can also be easily taken apart for cleaning.

### M & M .292 CAN BE RUN UPRIGHT OR INVERTED

You can invert this motor in a few seconds.

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All M & M wheels can be inflated and deflated

bottom. If possible get a small variable speed motor or use variable pulleys. Best results are obtained with black ink colored water (about 1" deep) and only a little of a fine-grained aluminum powder.

It is best to keep test sections no longer than 5" or wider than 2". Make them about 1-1/2" high.

Use floodlights at all times at a low angle to the water. For photographs use 6 photofloods at about 4 ft. with an exposure of 1/25 at F4.5.

## The Colibri Takes The Air

(Continued from page 11)

bands by cementing pieces of wire or bamboo at the point of contact.

### Flying

Get your center of gravity at or a little behind the center of the wing chord. The less incidence you have to use for a flat glide the better off you will be. Glide the model several times and make sure that she is not diving. Make the model circle to the left under power and don't expect it to climb with half throttle, because these small motors are not as efficient as their

big brothers. Well my time is up. Happy Landings!

## The Physics of The Airplane

(Continued from page 28)

also tend to "diffuse" readily. This means that the molecules of one gas are quite easily scattered among the molecules of another kind of gas. This action is, of course, not quite so rapid as that of a gas entering a free area or an area of good vacuum (as in the case of the aircraft engine combustion chamber), since the attendant motion is frequently arrested by molecular collisions. This is exactly the process which occurs in the carburetor of an aircraft engine. The gasoline fuel, in the presence of jacketed engine heat, gives off vapors which come into intimate contact with the atmospheric air entering the carburetor mixing chamber. The molecules of the two gases are buffeted about so that the two elements diffuse readily through one another, the individual molecules being widely disseminated throughout the confines of the mixing chamber. Then upon entering the combustion chamber of the engine

cylinder, being compressed and ignited, the resultant expansion causes the rapidly moving molecules of the gas to strike innumerable blows against the sides of the cylinder walls in accordance with the kinetic theory of the pressure of a gas. In the final analysis, all of these blows combined compose a continuous pressure which motivates the piston, the moving element in an engine.

Scientists have found it possible to calculate the velocity with which gases produce their impact against the walls of confining vessels. For standard air to produce a pressure of one atmosphere (roughly 14.7 pounds per square inch at San Francisco), a velocity of approximately 450 meters per second is required. For an equivalent pressure of hydrogen gas, which is only one-fourteenth as heavy as air, the requisite velocity acquires a high value, being 1850 meters per second. This condition accounts for the relatively high diffusion of hydrogen gas through porous walls. Lighter-than-aircraft employing hydrogen gas as a lifting medium suffered heavily due to the loss of hydrogen through the porous envelope of goldbeater's skin, thus necessitating fre-

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## THE DIAMOND DEMON

A newcomer to the BAY RIDGE line of top flight performers. The Diamond Demon has been taking contests ever since introduced to the field. Diamond-type construction saves hours of work and is rugged to an extreme. Designed for any Class B motor. Span 48" and weighs 10 ounces or less per square foot of area. Deluxe complete kit including full size plans, air wheels, dope, printed sheets, sells for only, postpaid, \$2.95

## THERMAL MAGNET

A plane that meets the demands of the most exacting builder. We asked Ray Heit to design a ship with a super climb, flat shallow glide and modern construction throughout. The THERMAL MAGNET was the answer. Six foot span, weighs 0.15 oz. per square foot ready to fly. Taper wing, high lift airfoil, shockproof landing gear. Special kit \$4.95 postpaid, includes full size plans, dope, cement, printed sheets, Deluxe kit with air wheels and covering silk, \$7.90 postpaid.

## SAY OUR CUSTOMERS

Bay Ridge ships "stay up and stand up" under all types of flying from coast to coast. Beginners and advanced modellers, kids and oldsters, build and fly them in sport and contest fields and hundreds of letters in our files from satisfied customers, will back almost any statement we make. Kits that are REALLY complete, construction that is SCIENTIFICALLY simple, and designs that are AERODYNAMICALLY perfect, are reason enough for BAY RIDGE success.

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Another ship from the drawing board of designer Ray Heit, who made his reputation on this swell performer. Recent improvements in design have made it one of the most consistent jobs in the Class B field. An outstanding flier for contest or sport flying. Four foot span, weighs less than 10 oz. per square foot ready to fly. Complete kit including airwheels and covering silk \$3.50 postpaid. Standard kit, less airwheels, \$2.50 postpaid.

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7/64-8 1/2"	Sc	225	70c
1/8-7 1/2"	Sc	225	75c
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quent replacement of the gas or a purification of the same by compression and then expansion in a gas reclamation plant. Coupled with the extreme degree of inflammability presented, this high rate of loss has been a potent factor in causing hydrogen gas to be completely eliminated from consideration as a lifting medium for balloons and airships in favor of the heavier, but more advantageous helium gas.

Although liquids diffuse rapidly into one another in a manner similar to that of gases, the process is not such a pronounced nature and acts considerably slower since the distance between the molecules is considerably less. An example of this that is frequently encountered in aeronautics involves the presence of water or condensed moisture in a gasoline fuel feed line or tank. The heavier water sinks to the bottom where it displaces an equal volume of gasoline fuel. In fact, this system of water displacement is used for emptying fuel tanks of gasoline which are imbedded in the ground at airports. Water is simply pumped into the tank, forcing the lighter weight gasoline to the surface and out the supply line to the airplane. This phenomena accounts for the design of the simple moisture trap incorporated into gasoline fuel tanks for lower powered engine installation employing a gravity feed. The spout, to which is attended the fuel feed line, extends upward an adequate amount above the floor of the tank to clear whatever moisture content might be deposited thereon as illustrated by drawing of Fig-

ure 1. The diffusing characteristic of liquids is more or less a function of the density of the respective liquids.

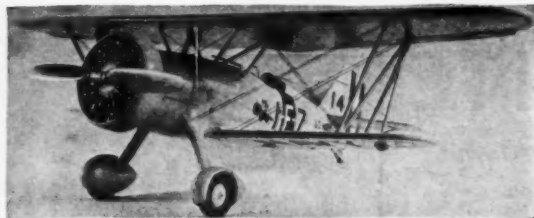
The diffusion of solids is far less pronounced than that of either liquids or gases, although the process can be effected under the proper conditions. A familiar example of this is embodied in the plating of structural metals with suitable materials which are impervious to corrosion. The diffusion of solids occurs to a more accentuated degree at elevated temperatures, as is evidenced by the process of welding aircraft structural members in the course of their construction or repair. Thus, it is amply proved that molecular motion exists in matter in the solid state as well as in the liquid or gaseous states.

We have seen that molecules in a liquid are entirely free to move with respect to one another. At the same time, they are held together by the attractive forces of the molecules on each other. This attraction for like molecules, as for instance, two molecules of water for each other, is termed "cohesion." In a similar manner, liquid molecules possess a tendency to cling to the molecules of a solid. This latter attraction of unlike molecules for each other is termed "adhesion." This tendency of the molecules to cling together becomes more pronounced in the case of the more viscous liquids as, for instance, oil and casein glue. The entire principle of lubrication of the high speed aircraft engine relies to a large extent upon the factor of adhesion. Hence the small particles, or globules, of viscous lubricating oil cling to the smooth cylinder walls and bearing surfaces, being due to the force of molecular attraction. Another familiar instance of molecular attraction exists in the case of glued joints in airplane structures. Occasionally, the tendency of adhesion becomes so great in the latter case that the joint formed in this manner exhibits greater strength than the material out of which it was formed. In general, the force of attraction of molecules for each other attains a large magnitude but acts through only a small distance.

The forces of molecular attraction in a liquid are responsible for the phenomena of surface tension, which causes the surface of any liquid to behave as if it were completely covered with a thin elastic film. This condition can be readily explained. The molecules existing in the mass of the liquid are subjected to attractive forces acting equally in all directions since they are entirely surrounded by similar molecules on all sides. However, the molecules on the surface have nothing to attract them on the side away from the liquid. As a consequence an unbalanced force is created, the molecules on the surface being pulled toward the interior of the liquid by the force of attraction of the molecules existing within the mass of the liquid. The film which is thus created can only be broken by the application of suitable force.

A common example in naval aviation provides an interesting example. Several patrol bombers were recently poised upon the calm waters of an inland harbor awaiting flight orders that were to take

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32 1/2" Span. Length 22 3/4". 1" Scale. Weight 6 oz. Color grey, top wing yellow.

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## BOEING F4B4 NAVY FIGHTER



22 1/2" Span. Length 14 1/2". 2 1/4" Scale

Set has 3" celluloid motor, 3 1/4" tapered aluminum cowling, set of paints, etc. Postpaid. \$2.95  
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them over the Pacific Ocean to the Pearl Harbor Airbase in Hawaii. The surface tension presented to the large hulls of these airplanes by the unruffled waters might have possibly proved an unsurmountable obstacle to the take-off had not smaller seaplanes roared on ahead of the wallowing big boats, thus creating a man-made chopiness which effectively shattered the troublesome water seal. It is equally dangerous for seaplanes to land on slick bodies of water, since the surface tension may be so great and momentarily reach such a high value when the hull or floats contact the water, that the seaplane would be nosed over and cracked up.

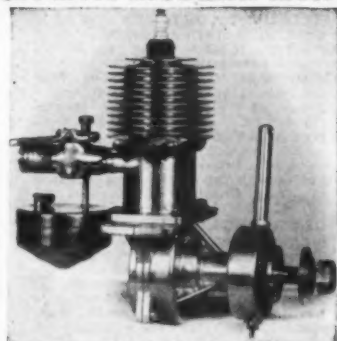
Seaplane floats as well as the larger flying boat hulls have a step built into their structure approximately one-third of their length from the stern. This arrangement, which assumes the form of a break in the bottom of the float or hull, is designed to assist in securing dynamic reaction from the water at the take-off. Common practice incorporates vent tubes into the flotation member. These vent tubes function in feeding air to the partial vacuum which exists behind the stepped portion of the float when it is in swift motion along the surface of the water. The admission of air into this area of

partial vacuum makes possible the attainment of high taxiing speeds, and most important from our present point of view, helps break the surface tension or seal existing between the bottom of the flotation member and the water. This type of construction is illustrated by the drawing of Figure 2.

The molecular forces which are responsible for the creation of surface tension also give rise to another condition called "capillarity," the practical application which is widely employed in the field of aeronautics. Should a glass tube of very small bore be dipped into a container of a liquid, say water, the water will immediately wet the inside of the tube and rise within it. The smaller the bore, or inside diameter, of the tube, the greater will be the height to which the liquid will rise. In the case of liquids which do not tend to wet the inside of the tube, as for instance, mercury, the column of liquid is depressed instead of rising within the tube. Capillarity is merely the result of the forces of cohesion and adhesion at work.

It is readily seen that if the cohesive forces between the molecules of the liquid are less effective than the adhesive forces between the liquid molecules and the

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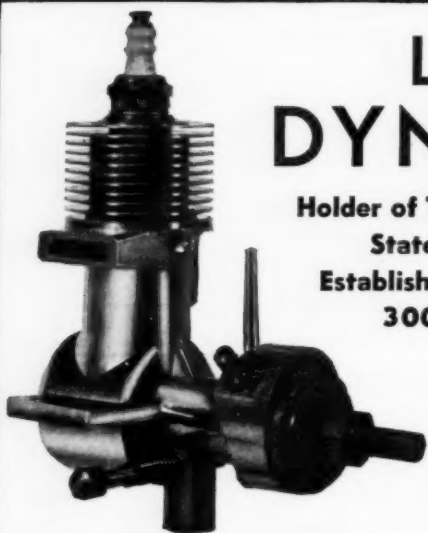
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Displacement .374 cu. in.  
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molecules on the wall of the tube, the liquid will wet the side of the capillary tube and will immediately rise therein. The reverse is true of the mercury where the cohesive forces are of greater effectiveness than that of the adhesive forces. A force of capillary attraction is also exerted by a porous body in drawing up a fluid, the principles underlying this action being exactly the same as outlined previously.

Aircraft inspectors while engaged in the routine checking of woods as an airplane construction material are extremely vigilant in the detection of spiral grain. An appreciable deviation from straight grain in airplane woods reduces their strength characteristics considerably and represents sufficient cause for rejection. A widely employed and authentic test for this functional discrepancy consists of placing a few drops of brilliantly-colored dye or ink, red, blue or green, on the tangential face of the suspected timber specimen and noting the direction which capillary action draws the ink along the fiber of the grain. Distant-reading pressure thermometers of the type installed on aircraft engines for the recording of coolant and oil temperatures are equipped with a suitable capillary. In this case, it consists of a length of plain drawn copper tubing, the internal diameter of which is extremely small, measuring from approximately 0.014 to 0.020 inches, and protected by a flexible metallic braided casing.

The capillary attaches to a standard bourdon gauge at one end and a suitable

bulb containing a liquid whose change in volume or vapor pressure with temperature is transmitted through a capillary to operate the gauge. The volatile liquid in this case is methyl chloride. The liquid will always accumulate in the cooler parts of the assembly if it is free to move without restraint. Thus, when the bulb is located in the hottest area, the capillary and the gauge will fill with the liquid. The indication of the thermometer is then based upon the amount of the liquid still remaining within the bulb.

The capillary action of a gas is made use of in the capillary-leak type of rate-of-climb indicators. These instruments function in indicating the rate of ascent or descent of an airplane. The instrument, which is illustrated in Figure 3, operates as follows: One side of the sensitive diaphragm is exposed to the outside atmosphere, the entire assembly being connected to the pointer moving over the face of the instrument by means of a suitable mechanical linkage. The capillary leak tube functions in attaining an equalization of the pressure within the system. In view of the fact that the flow of a gas through a capillary tube depends upon the viscosity of the gas only and is independent of density, the calibration of the instrument will be the same at all altitudes. The pressure difference is indicated on the dial which is graduated at rate of climb. For instance, in descending, the pressure of the instrument will lag somewhat behind the pressure of the outside atmosphere because of the resistance offered by the capillary tube.

Note: The authors wish to extend thanks to the many readers who have shown interest in this series of articles and who have been so kind as to write letters and comments.

## Build and Fly the Fairchild "82"

(Continued from page 23)

longerons are "vee" shaped and cemented together. A short piece of 1/16" square stock used as an upright completes the tail end. A small tail wheel made from either wood or metal is attached to a fork axle and mounted with an application of cement to a horizontal cross member situated between the lower longerons. See side view fuselage drawing. Bulkheads 3 to 8 inclusive are held rigidly in position by cementing 1/16" square balsa stringers of proper lengths in the notches provided within. Arrows identify the positions for the 1/16" square stringers.

### Nose Cowling

The nose cowling unit is made up in three parts; the ring cowl former, former 1, 2 and 2A. Measurements for cowling formers may be taken directly from the plan for they are in full scale. Former number 1 is identical to size and shape of former number 2 with an exception that it is twice the latter's thickness, and is solid only for the diamond-shaped nose plug hole. Former number 2 is cut to shape from 1/16" thickness sheet balsa. Space both 1 and 2 apart properly and insert short sized 1/16" square balsa stringers in their notches. The ring cowl former is finally cemented flush to num-

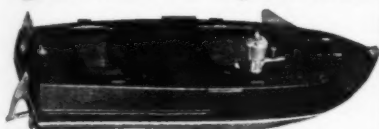


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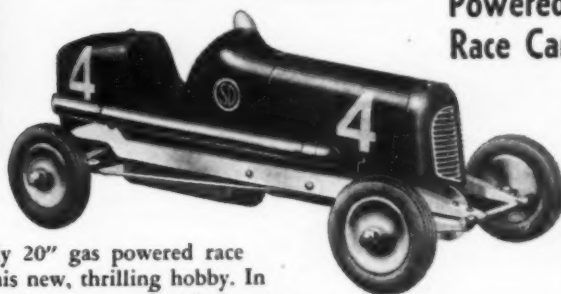


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ber 1. Lastly, the cowl unit is completely covered with 1/32" sheet balsa which is applied in four equal sized sections. Use small model making pins to assist holding the curved portions of sheet covering in position until the cement hardens sufficiently to warrant their removal.

### Nose Plug

A soft balsa nose plug is carved to shape in the manner shown on plate 2. The rear portion of the plug may be made either as an integral part of the plug itself or separately and cemented into position. The latter method is simpler and just as efficient. A hole 1/16" diameter is drilled through the center of the plug and an eyelet bearing cemented in the front end. Be sure the plug fits snugly in position.

### Cabin Detail

The cabin hatch, of which detailed views are given on plate 2, is cut to shape from a soft balsa block measuring 7/32"

x 7/8" x 2-1/8". The underside is hollowed out to a 1/16" thickness. The outer side is finished off with a smooth sanding. Cabin hatch former number 6 (full size) (left half shown only) is cut to shape and cemented into position as indicated on the side and top view of the fuselage drawing. Following this cement is applied to the rear most portion of the cabin hatch and is firmly pressed against former 6. Then, small props cut from 1/16" square stock of proper size are cemented in upright positions to provide support for the cabin itself. These upright supports are identified by arrows on the side view drawing of the fuselage.

The landing gear wire is attached at this point to the fuselage. The wire itself is bent to shape from .038 and rests upon the lower longerons at the same time being cemented securely. Upon the completion of this operation and with the cement well hardened, the fuselage is ready to take its "skin" covering. The covering

consists of applying 1/32" sheet balsa with the greatest care.

### Fuselage Covering

The sheet balsa skin is applied in three sections on each of the fuselage sides. The side sections are identified by two sets of a series of dotted lines running the length of the fuselage. Space for the windows are cut as shown only in the upper section. In attaching each section, dab the sides of the bulkheads generously with cement and then press one section at a time firmly into position. Small model-making pins may be used to assist in holding the sections until the cement hardens.

Nearest the cowl where the fuselage takes on a more circular section it will be necessary to apply strips of gradual widths. This must be executed in a careful manner with each strip lying as close to the other as possible. Wood filler is used to fill in open spaces. The roof of the body is covered with a single piece

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of sheet. The under-portion of the body is also covered with a single piece. At the rearmost portion of this piece an opening measuring 1/2" at the front end and 1" long is provided to facilitate application or removal of the power strands. The entire fuselage upon completion is given two coats of dope and afterward a fine sanding.

## Landing Gear

The main landing gear struts are identified on plate 3 by L-4 of which two sets are cut to shape and joined as shown. The front of the foremost strut is grooved slightly to accommodate the landing gear wire. The wire is clearly shown in this position by the black line running down the length of the front landing gear strut in the front view drawing. The next addition to the landing gear assembly are the shock absorbing struts L-5. The upper portion of this strut is made from a piece of bamboo imbedded partway and cemented as shown. The lower ends of L-5 are cemented to landing gear struts L-4. L-5 is braced at the top by struts L-1, 2 and 3. Cement all brace strut joinings generously. A pair of hard wood wheels 1-1/4" diameter slipped onto each side of the axles and a drop of cement complete the landing gear detail.

## Propeller

Pine or bass may be used for the propeller. The prop block should be a select piece free from knots cut to the following measurements: 3/4" x 1-1/2" x 7-1/2". Cut carefully to shape, balance perfectly

and complete by securely mounting the prop shaft in the center of the hub with cement. A couple of brass washers are placed onto the shaft before forming the curved hook.

## Tail Surfaces

The ribs sections for both the rudder and elevator surfaces are presented on plate 1. All ribs for the elevator are cut to shape from 1/16" sheet each bearing a 1/16" square hole. The outline frame of the rudder is shaped from 3/16" sheet tapering both at the leading and trailing edges to form a full streamline section.

The rudder fillet piece is shaped from a soft block of balsa measuring 9/32" x 3/8" x 3-3/4". When completed cement flush to the proper position on top of the rear of the fuselage.

The elevator is made in halves; each half mounting five ribs cut to the streamlined shape as shown. The fifth rib is placed nearest the fuselage side at the angular position indicated. A single spar 1/16" square bass is used to hold the ribs at proper intervals while 3/16" square balsa is used for the leading edge and 1/16" x 1/8" for the trailing edge. The tips are composed of pieces fitted to form a tapering edge. Cover both rudder and elevator parts with fine Jap tissue, water sprayed once, and complete with a single coat of dope. Mount the rudder in position over the fillet as shown. The elevator parts are cemented to each fuselage side and braced from underneath by brace struts 1/16" x 1/8" cut to necessary length. Be sure that the elevator lies perfectly horizontal. Struts E-1 and E-2 shown in full size on plate 3 are the elevator brace struts.

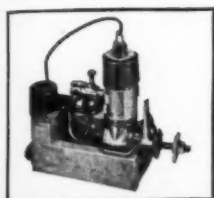
## Wing Structure

The long narrow wing employs a typical Grant X airfoil section which we believe, for the first time, has been used in a flying scale model. In flight the model shows excellent climbing qualities with glides of unusual endurance. All twenty-one ribs are cut as required from 1/16" sheet soft balsa and cemented at proper intervals onto a single spar measuring 3/16" x 7/16" x 26-3/4" long. A hard balsa leading edge selected from the dimensions specified on plate 2 is sanded to shape to complete the front edge of the airfoil section and finally cemented firmly in position. The trailing edge is also selected hard balsa, tapered as shown, and cemented in position. Two stub ribs D are cut to the required shape and thickness, tapered and cemented flush to the sides of the first ribs on each side of the C/L mark. The slight recess existing between the stub ribs and rib E is filled in with a piece of sheet balsa measuring 1/16" x 17/32" x 2" long. Apply cement at all joints. The wing tip pieces are cut to shape from 1/16" sheet and fitted securely. A point to be observed carefully before cementing ribs into position is the amount of taper in the main spar nearest the last two ribs A and B.

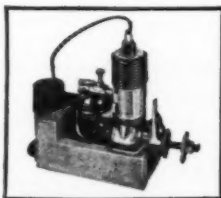
The break for the dihedral attaining an angle of 1-3/4" is made at the points marked X shown at the center section in the top view plan of the wing, plate 2. Apply cement generously over these cracks and allow plenty of time to harden.

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Smoothen up the rough spot with sandpaper and complete the wing structure by covering with fine Jap tissue. A single water spray over both sides of the entire wing and upon drying, a single coat of dope, assures you of a well balanced strong wing possessing good lifting characteristics.

### Wing Struts

Struts W-1 and W-2 are the wing braces and are cut to shape and streamlined from hard balsa. In attaching struts between fuselage and wing, note that the rear strut is mounted straight in relation to the both points, while the front strut slants forward. The side view of the fuselage explains this detail clearly. Interbrace strut W-3, shown in position on front view plan, is made up from three pieces of hard balsa and cemented to form a single unit. A set of two will be needed.

### Assembly

In mounting the wing onto the fuselage for final assembly, apply a generous amount of cement to insides of the stub ribs D, along the fillet piece between them and along the underside of the trailing edge. Place the wing firmly into position. The fairing piece shown on plate 2 is then cemented directly over the rear portion of the wing as indicated in its position on the side view drawing of the fuselage. This part provides a smooth flow between the wing and the fuselage. Due to the slight undercamber of the airfoil section, a small opening will be noticed just between the lower part of

the wing and the part of the fuselage it rests upon. This space may be filled in by cementing a small piece of sheet balsa fitted to conform to the required shape. The wing struts including unit W-3 are cemented into position securely thus completing the model.

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### The Instructor

(Continued from page 26)

enjoyment. Remember that you put considerable time and effort and a bit of cash into the construction of the craft—it's no crate—it's a potential top-place ship if you'll give the plane half a chance. Who ever heard of the army or navy accepting a new design airplane without first conducting exhaustive tests, numerous check-ups and a period devoted to studying the plane's

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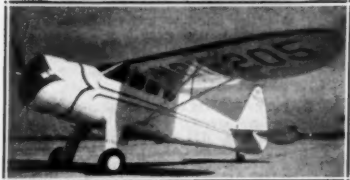


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#### MODEL AIRPLANE NEWS

551 5th Ave., N. Y. C.

peculiarities?

And if you're a bit on the novice side . . . ask the experts for advice . . . don't let those "grandstand kibitzers" (recognized by all talk and no knowledge) try to adjust your craft. Keep an eye on the leading flyers and learn from them . . . they're a grand bunch of fellows—always ready to lend aid if properly and courteously approached. But don't pick an inopportune moment to intrude with a request for help . . . wait till your "expert" has a free minute or two . . . don't forget, he's out there to compete, too.

The Instructor hopes he has been instrumental in making you pause to reflect—to promise that you'll be a bit wiser when preparing for that next meet—that you'll have all the necessary paraphernalia for correct contest participation—tools, replacement parts and a couple of bottles of "soda pop" to sooth that inner man when the competition becomes tough, or the plane just doesn't seem to perform properly.

Relax. Try taking it a bit easier—it's a heap more fun. Right?

## A Soarer Without A Tail

(Continued from page 17)

then roughly shaped to the proper cross-sections with a knife. Note that the top has a "Vee" shaped recess to accommodate the dihedral of the center section. Pin the wing in position on the body and check the balance. The model should balance about 2 3/4" from the leading edge of the center section. If nose-heavy carve the nose a trifle narrower till the balance is perfect. In the unlikely event that tail heaviness is present, ballast may be forced into the nose to correct this condition. The fuselage may now be sanded, covered with sections of tissue, doped several times and cemented solidly to the wing.

Hooks G and H are formed of .034 piano wire and cemented securely in the positions given on the plans.

The "golf club" is simply made of a 1/4" square boom 16" long, and a rudder of 1/16" sheet. Hooks I and J are glued to the boom. The upper loop of J is NOT cemented to the wing, but merely rests against the underside to prevent the set of the auxiliary rudder from rolling it to a horizontal position. The loop should press against the left side, if the auxiliary rudder is set to the right. This is the proper line-up for counteracting the turn of a glider that circles to the left in free flight as did the original. If the model is to circle in the opposite direction all other settings are also necessarily reversed. These directions may sound a bit complicated but if followed carefully no trouble can result.

### Flying

The model if properly balanced will probably glide perfectly the first time. Minor adjustments in the gliding angle may be made by bending the aluminum trimmer tabs. The tailless is best circled by warping the rudders in the desired direction, supplemented by bending the elevator on the inside of the turn-up slightly. A circle about thirty feet in diameter is most efficient.

For tow-line flying, tie about fifty feet of No. 8 cotton thread to the boom, approximately one inch behind hook I. Have your

## CLASSIFIED DIRECTORY

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### MODEL AIRPLANES—KITS—SUPPLIES

**DEALERS, Jobbers**—Real profits on rubber and gas supplies. Stamp brings wholesale list. Modelers write for retail list. Waterbury Model Builders Supply, 119 Cherry St., Waterbury, Conn.

**BROWN AERO RUBBER**—Hodgman Rubber Company, 261 Fifth Avenue, New York City. Chicago Office, 412 South Wells Street. Dealers and manufacturers only.

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**FREE**—Get your copy of the 1939 GMS Super-Catalogue today. "Everything for Gas Modelers." Gas Model Specialties, 128 West Washington, Syracuse, N. Y.

**EARN MORE MONEY**—Dealers—Jobbers—Send for 1939 catalogue of model supplies—Complete—low prices—quality merchandise—new items. Mercury, 1592T Lincoln Pl., Brooklyn, N. Y.

**DON'T** Fail to get this special offer. Dope and cement 3c a pint. Include 10c for postage. Send for free catalog with other bargains. Ranger Model Supply Co., Dept. C, 388-14th Street, Brooklyn, New York.

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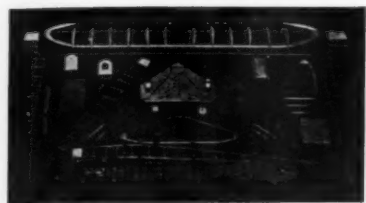
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Winners' pictures will be published in this magazine.

If your dealer can't supply you, order direct.  
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Patent Pending

DESIGNERS OF THE AIR-TRACK RADIO SAFELANDING SYSTEM AND OTHER INTERNATIONALLY KNOWN RADIO AND FLYING AIDS

assistant hold the glider level and at a slight upward angle. Start to run slowly, increasing your speed till the model will rise no more. If the full length of the thread has not been converted into altitude, it should be attached slightly farther back on the boom. Should the model keel over while being towed, correct this tendency by giving the "golf club" opposite rudder. Unlike other soarers the tow-line may be given a strong tug to release the glider. The quick recovery and "settling down" of the tailless makes it impossible to lose altitude in spite of any maneuver this procedure may cause.

For conversion into an experimental, powered model a trough to retain a motor stick is built on the center of the wing. It consists of two sides; E, of 1/16" sheet in which the grain runs vertically and a filler block, D, of 1/4" sheet fitted on the center rib to prevent the motor stick, F, of 1/4" x 5/16" hard balsa from rocking. The prop is carved from a block 3/4" x 1 3/8" x 7 1/2" laid out as shown on the plans. It is preferable to carve a left-hand type prop, to permit hand winding in the accustomed clockwise direction. The motor stick with eight stands of 1/8" flat rubber should be of such length that with the prop about one inch from the trailing edge, the model balances at the same point as for a soarer.

While we are personally convinced of the superiority of the tailless as a tow-line soarer, further experiments such as using a tractor propeller, increasing the model's weight and especially with gas models of this design will prove most interesting and fruitful projects.

## Model America at the Nationals

(Continued from page 29)

the model builders on the field. Apparently it was another case of super-organization interfering with its own functioning because of its ponderous nature.

This consideration made it necessary to hand-launch the gas powered models, as the fairly long grass and dead air made it nearly impossible for the little ships to take off from the ground. This is not in accordance with the N.A.A. rules, unfortunately, and therefore flights made under these conditions were ineligible for recognition under the N.A.A. records. This diversion from the customary manner of launching should not be attributed to the lack of efficiency or energy of the meet officials, for they did everything in their power to overcome the innumerable unexpected obstacles which prevailed throughout the contest.

A heavy shower early on Saturday morning cleared the air for the Gas Model Event which fell on that day. However, it induced a fairly lively breeze which cut the flight times to a certain extent and was the cause of a number of spectacular crashes. Except for the hazard to life and limb of the airplane pilots, the National Air Races have nothing on the National Model Championships. Even the most phlegmatic model builders could not help but thrill at many of the maneuvers executed by the gas powered ships during the afternoon.

A number of planes left their wings fluttering in mid-air while they roared earthward from several hundred feet altitude, to disintegrate into a spray of uncollectable

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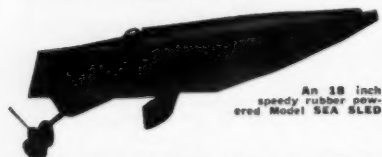


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It is made from ready cut California Sugar Pine with brass fittings and die stamped brass propeller. All parts and materials, as in all Advanced Kits, are furnished including the paints. This Kit Sells for \$1.50 (plus 25c for freight, tag and mailing.)

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**MODEL AIRPLANE NEWS**  
551 5th Ave., NYC.

parts, upon impact with the ground. Flights were run off with great rapidity and the weighing tables kept eight take-off runways supplied with continuous activity. This performance, from a contest director's standpoint, was highly remarkable, for in the 7-1/2 hours of the contest, 1100 flights were made! This kept the headquarters tent staff working along at a great rate, assorting cards and recording the names and times of the contestants. As usual, a crowd of over-interested and enthusiastic spectators interfered, to some extent, with the operation of the meet. On a number of occasions flights had to be stopped and the

field cleared before the ships were again allowed to take off. This was entirely in the interest of the spectators, inasmuch as the type of plane which prevailed at the contest was the high-powered, low-weight jobs which tore skyward with the velocity of a skyrocket. Many construction kits of this type of plane were produced by one manufacturer who gained great prestige at the fine performance which it evidenced. Many of the events were won by this type of ship. This manufacturer is indeed fortunate in the fact that the new rules, passed by the Academy of Model Aeronautics, encour.

(Continued on page 58)

#### POWER MODEL CONTEST

##### Class "C" Jr.-Sr.

Roy Roush.....17	Ferndale.....465.0	Gar Wood Tro. & Miniature
E. Barron, Jr.....19	Grayslake.....241.06	G. P. Burgess Trophy
F. J. Lorenz.....19	St. Louis.....221.3	River Rouge Ex. Ace Motor
M. Spector.....17	Cincinnati, Ohio.....208.93	Baby Cyclone Engine
F. Bergert.....18	St. Louis, Mo.....173.4	Berkley Trophy
R. E. Hoffmeyer, Jr. 20	Akron, Ohio.....147.46	48 Everready Batts. & Xch. Awd.
F. D. Page, Jr.....17	Williamsport.....137.93	Aero Coil & Xch. Cl. Award
Ceylon Frqser.....19	Little Rock, Ark.....137.73	Xch. Cl. Awd. & Xacto Knife
Oliver Pfeil.....19	San Antonio, Tex.....135.	Xch. Cl. Awd. & Xacto Knife
Frank Vollrath.....19	Indianapolis, Ind.....134.6	Xch. Cl. Awd. & Xacto Knife

#### POWER MODEL CONTEST

##### Class "C" Open

Dick Everett.....21	Elm Grove.....295.3	E. G. Budd Mfg. Co. Trophy
Wm. J. Allsopp.....21	Detroit.....231.	Bay Ridge Trophy
Frank Draper.....35	Charleston.....200.66	Synco Ace Special
Geo. Meyer.....23	Overland.....191.26	Mod. Parts Wh. & Xch. Cl.
Alfred Towle.....24	Syracuse.....181.06	Mercury Rep. Kit & Xch. Cl.
W. R. Cruthirds.....46	Little Rock.....171.33	Aero Coil & Xch. Cl.
Henry Gebbard.....46	Milwaukee.....143.82	Xch. Cl. & Xacto Knife Set
Walter Good.....23	Kalamazoo.....131.86	Xch. Cl. & Xacto Knife Set
Dobt. Gable.....23	Reading.....125.66	Xch. Cl. & Xacto Knife Set
Edwin Schunke.....25	Milwaukee.....122.8	Xch. Cl. & Xacto Knife Set

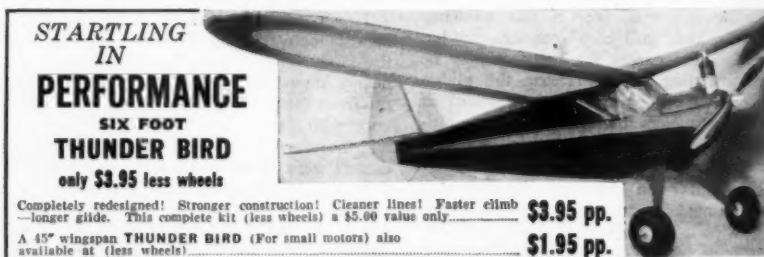
#### GAS POWER

##### Class "B" Jr.-Sr.

Max Wassem.....16	New Philadelphia 535.33	\$25 Ohlsson-Rice Award
Herbert Friedlander..17	Brooklyn.....377.4	\$10 Pesco Award

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Andrew Petersen.....	24	Los Angeles.....	99.4
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A. G. Wheler, Jr.....	18	Syracuse.....	159.93
Bill Redeker.....	15	Cincinnati.....	150.73
Dean Allen.....	16	Detroit.....	117.6
Robert Jacobsen.....	19	Philadelphia.....	110.47
Jack Dietz.....	19	Cincinnati.....	102.4
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Dick Korda.....	24	Cleveland, Ohio.....	175.4
Chester D. Lanza.....	25	Cleveland, Ohio.....	134.73
Walter Good.....	23	Kalamazoo, Mich.....	130.07
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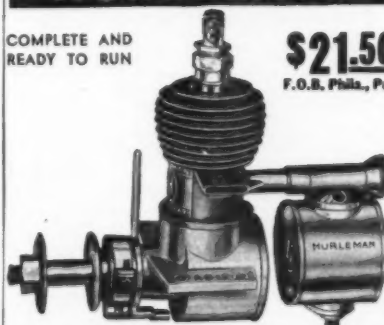
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### Model America at the Nationals (Continued from page 56)

aged this type of model. Fortunately the weather was excellent during the four days of the meet. The flying activities were climaxed on Saturday night by a banquet at the Fort Shelby Hotel. After the ravages of the "inner man" had been satisfied by some very fine food, prepared by the hotel chef, the winners of the various events were presented with their awards. These consisted of an enormous number of trophies, cups and plaques as well as cash, merchandise and subscriptions to various aeronautical magazines. The

awarding of the trophies required two hours, which will give you some idea as to the number of winners who carried home the "hardware," so to speak. This was done amidst the continuous stream of flashlight bulbs as newspaper photographers snapped pictures of the winners. At the speakers table were members of the Detroit Exchange Clubs, who sponsored the contest. The President, Mr. Al Bruder, gave a short address in which he told how he was amazed at the achievements of the young men in this particular field. A number of other guests, prominent in the civic affairs of Detroit, were present.

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1/16x1/8.....18 for 5c	<b>CLEAR DOPE</b>
1/16x3/16.....10, 5c	<b>OR THINNER</b>
1/16x1/4.....5 for 5c	5c per oz.; large bottle, 8c; 1/2 pt. 35c
3/32x3/32.....15, 5c	<b>COLOR DOPE</b>
1/8x1/8.....15 for 3c	5c per oz.; large bottle, 8c; 1/2 pt. 35c
1/8x3/16.....6 for 3c	<b>PROPELLERS</b>
1/8x1/4.....3 for 3c	Balsa, Paul-O
3/16x3/16.....4, 10c	5" 4c 10c
1/2x1/4.....3 for 5c	6" 5c 15c
3/8x1/4.....3 for 10c	7" 6c 20c
1/2x1/2.....3 for 10c	8" 7c 25c
5-foot Balsa, 1 lb. 15c	9" 8c 30c
5-foot Balsa, 1 lb. 15c	10" 8c 35c
5-foot Balsa, 1 lb. 15c	12" 10c 40c
5-foot Balsa, 1 lb. 15c	14" 14c 45c
5-foot Balsa, 1 lb. 15c	15" 15c 45c
5-foot Balsa, 1 lb. 15c	<b>RUBBER</b>
5-foot Balsa, 1 lb. 15c	36" 1/2" 25 ft. 5c
5-foot Balsa, 1 lb. 15c	1/16 3/4" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	3/16 1" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	1/2 1 1/4" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	3/4 1 3/4" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	1 1/2 2" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	2 1/2 3" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	3 1/2 4" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	4 1/2 5" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	5 1/2 6" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	6 1/2 7" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	7 1/2 8" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	8 1/2 9" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	9 1/2 10" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	10 1/2 11" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	11 1/2 12" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	12 1/2 13" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	13 1/2 14" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	14 1/2 15" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	15 1/2 16" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	16 1/2 17" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	17 1/2 18" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	18 1/2 19" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	19 1/2 20" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	20 1/2 21" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	21 1/2 22" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	22 1/2 23" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	23 1/2 24" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	24 1/2 25" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	25 1/2 26" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	26 1/2 27" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	27 1/2 28" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	28 1/2 29" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	29 1/2 30" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	30 1/2 31" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	31 1/2 32" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	32 1/2 33" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	33 1/2 34" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	34 1/2 35" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	35 1/2 36" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	36 1/2 37" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	37 1/2 38" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	38 1/2 39" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	39 1/2 40" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	40 1/2 41" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	41 1/2 42" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	42 1/2 43" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	43 1/2 44" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	44 1/2 45" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	45 1/2 46" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	46 1/2 47" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	47 1/2 48" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	48 1/2 49" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	49 1/2 50" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	50 1/2 51" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	51 1/2 52" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	52 1/2 53" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	53 1/2 54" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	54 1/2 55" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	55 1/2 56" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	56 1/2 57" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	57 1/2 58" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	58 1/2 59" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	59 1/2 60" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	60 1/2 61" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	61 1/2 62" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	62 1/2 63" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	63 1/2 64" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	64 1/2 65" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	65 1/2 66" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	66 1/2 67" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	67 1/2 68" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	68 1/2 69" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	69 1/2 70" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	70 1/2 71" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	71 1/2 72" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	72 1/2 73" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	73 1/2 74" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	74 1/2 75" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	75 1/2 76" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	76 1/2 77" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	77 1/2 78" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	78 1/2 79" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	79 1/2 80" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	80 1/2 81" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	81 1/2 82" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	82 1/2 83" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	83 1/2 84" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	84 1/2 85" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	85 1/2 86" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	86 1/2 87" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	87 1/2 88" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	88 1/2 89" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	89 1/2 90" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	90 1/2 91" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	91 1/2 92" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	92 1/2 93" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	93 1/2 94" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	94 1/2 95" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	95 1/2 96" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	96 1/2 97" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	97 1/2 98" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	98 1/2 99" 15 ft. 5c
5-foot Balsa, 1 lb. 15c	99 1/2 100" 15 ft. 5c

**FREE** 90 1/16 x 1/16 x 18 Balsa, 1 bottle Cement, and 1 pair 2" wheels FREE with all orders for \$1.00 or more for supplies only.

### GAS MODEL KITS

Buccaneer 48.....\$2.95	Obleson 22.....\$16.50
Buccaneer Standard 5.00	Gold Seal.....18.50
Cavalier Standard.....5.95	Brown, Jr. "D".....12.50
Comet Clipper.....4.95	Brown, Jr. "B".....21.50
Comet Zipper.....3.95	Mighty Midget (Kit).....7.85
Comet Mercury.....2.95	Mighty Midget (assembled).....9.50
Imperial "Mystery 66".....3.95	We carry full line of parts for above motors

### MOTORS

Obleson 22.....\$16.50	6-8-10-12-14
Gold Seal.....18.50	2 ft.....1c
Brown, Jr. "D".....12.50	1/16 dia. 5 ft. 12c
Brown, Jr. "B".....21.50	3/32 dia. 5 ft. 13c
Mighty Midget (Kit).....7.85	1/2 dia. 5 ft. 25c
Mighty Midget (assembled).....9.50	1/2 dia. 1/4 ft. 10c
We carry full line of parts for above motors	

### SPECIAL OFFER

with each \$2.00 gas model order, 1 pair 3/4" air wheels (value \$1.50) for only 75c.

### FREE POSTAGE

on all orders (large or small) in U. S. Add 10c packing charge: Canada, U. S. possessions, and foreign, over \$1.00 add 15c; Foreign, under \$1.00, add 15c. Packing charge must not be considered as part of the order. No C.O.D.'s. No stamps.

### SHEET ALUM.

.0004x11x17	2 sheets 2c
.005 in. 6x6 5c	
.010 in. 6x6 6c	
1/32.....6x6.....15c	
1/16.....6x6.....30c	
1/8.....6x6.....45c	
1/4.....6x6.....60c	
1/2.....6x6.....75c	
3/4.....6x6.....90c	
1.....6x6.....105c	
1 1/2.....6x6.....120c	
2.....6x6.....135c	
3.....6x6.....150c	
4.....6x6.....165c	
5.....6x6.....180c	
6.....6x6.....195c	
7.....6x6.....210c	
8.....6x6.....225c	
9.....6x6.....240c	
10.....6x6.....255c	
11.....6x6.....270c	
12.....6x6.....285c	
13.....6x6.....300c	
14.....6x6.....315c	
15.....6x6.....330c	
16.....6x6.....345c	
17.....6x6.....360c	
18.....6x6.....375c	
19.....6x6.....390c	
20.....6x6.....405c	
21.....6x6.....420c	
22.....6x6.....435c	
23.....6x6.....450c	
24.....6x6.....465c	
25.....6x6.....480c	
26.....6x6.....495c	
27.....6x6.....510c	
28.....6x6.....525c	
29.....6x6.....540c	
30.....6x6.....555c	
31.....6x6.....570c	
32.....6x6.....585c	
33.....6x6.....600c	
34.....6x6.....615c	
35.....6x6.....630c	
36.....6x6.....645c	
37.....6x6.....660c	
38.....6x6.....675c	
39.....6x6.....690c	
40.....6x6.....705c	
41.....6x6.....720c	
42.....6x6.....735c	
43.....6x6.....750c	
44.....6x6.....765c	
45.....6x6.....780c	
46.....6x6.....795c	
47.....6x6.....810c	
48.....6x6.....825c	
49.....6x6.....840c	
50.....6x6.....855c	
51.....6x6.....870c	
52.....6x6.....885c	
53.....6x6.....900c	
54.....6x6.....915c	
55.....6x6.....930c	
56.....6x6.....945c	
57.....6x6.....960c	
58.....6x6.....975c	
59.....6x6.....990c	
60.....6x6.....1005c	
61.....6x6.....1020c	
62.....6x6.....1035c	
63.....6x6.....1050c	
64.....6x6.....1065c	
65.....6x6.....1080c	
66.....6x6.....1095c	
67.....6x6.....1110c	
68.....6x6.....1125c	
69.....6x6.....1140c	
70.....6x6.....1155c	
71.....6x6.....1170c	
72.....6x6.....1185c	
73.....6x6.....1200c	
74.....6x6.....1215c	
75.....6x6.....1230c	
76.....6x6.....1245c	
77.....6x6.....1260c	
78.....6x6.....1275c	
79.....6x6.....1290c	
80.....6x6.....1305c	
81.....6x6.....1320c	
82.....6x6.....1335c	
83.....6x6.....1350c	
84.....6x6.....1365c	
85.....6x6.....1380c	
86.....6x6.....1395c	
87.....6x6.....1410c	
88.....6x6.....1425c	
89.....6x6.....1440c	
90.....6x6.....1455c	
91.....6x6.....1470c	
92.....6x6.....1485c	
93.....6x6.....1500c	
94.....6x6.....1515c	
95.....6x6.....1530c	
96.....6x6.....1545c	
97.....6x6.....1560c	
98.....6x6.....1575c	
99.....6x6.....1590c	
100.....6x6.....1605c	

### FLIGHT TIMER

50 Sec.....50	9-10".....50c
0-sec. to 1 M. 2.00	11"-12".....65c
Austin Timer 1.25	13"-14".....70c
	15".....85c

### GAS PROPS

9"-10".....50c	13"-14".....70c
11"-12".....65c	15".....85c

### PLASTIC BALSA

Large can.....25c	1/16, 3/32, 1/2.....7c
	1/2, 3/4, 1.....10c
	1, 1 1/2, 2.....15c
	2 1/2, 3, 4.....20c
	4 1/2, 5, 6.....25c
	6 1/2, 7, 8.....30c
	8 1/2, 9, 10.....35c
	10 1/2, 11, 12.....40c
	12 1/2, 13, 14.....45c
	14 1/2, 15, 16.....50c
	16 1/2, 17, 18.....55c
	18 1/2, 19, 20.....60c
	20 1/2, 21, 22.....65c
	22 1/2, 23, 24.....70c
	24 1/2, 25, 26.....75c
	26 1/2, 27, 28.....80c
	28 1/2, 29, 30.....85c
	30 1/2, 31, 32.....90c
	32 1/2, 33, 34.....95c
	34 1/2, 35, 36.....100c
	36 1/2, 37, 38.....105c
	38 1/2, 39, 40.....110c
	40 1/2, 41, 42.....115c
	42 1/2, 43, 44.....120c
	44 1/2, 45, 46.....125c
	46 1/2, 47, 48.....130c
	48 1/2, 49, 50.....135c
	50 1/2, 51, 52.....140c
	52 1/2, 53, 54.....145c
	54 1/2, 55, 56.....150c
	56 1/2, 57, 58.....155c
	58 1/2, 59, 60.....160c
	60 1/2, 61, 62.....165c
	62 1/2, 63, 64.....170c
	64 1/2, 65, 66.....175c
	66 1/2, 67, 68.....180c
	68 1/2, 69, 70.....185c
	70 1/2, 71, 72.....190c

**O. K. TWIN \$35.00**

Displ. 1.2 HP 1/2

Protected by  
Patents and  
Patents Pend.**The Sensation at the Nationals**

Hundreds of contestants, hobbyists and dealers, who have had an opportunity to see this motor demonstrated, marveled at its outstanding performance. This motor solves the power problem for the radio control experimenter, the hobbyist flying big ships and for hobbyists in general seeking light weight power applications for canoes, ki-yaks, bicycles, gliders, etc.

**SPECIFICATIONS**

Bore & stroke .900" x .950"—Displ. 1.2—HP 1/2—R.P.M.'s 800-10,000 (with 18" high pitch prop 5000)—Width overall 7 3/4"—Weight 22 1/2 oz.—Radial mounting—Champion spark plug—custom-made coil—Ball bearing in front housing taking radial and thrust load.

**O. K. MOTORS START EASY—RUN CONSISTENTLY**

O.K. DeLuxe.....\$21.00  
O.K. Standard.....\$17.80  
Marine—Inverted, \$1.50 extra.  
Displ. .616 HP—1/5

*Be Thrilled With the Power Flow of the O. K.***O. K. Sets New Standards**

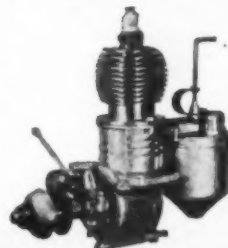
"O.K." motors have one piece all steel cylinders with walls finished by grinding and lapping. Pistons individually fitted to cylinders are hardened steel without rings, piston pins are hollow drilled and hardened, connecting rods are drop forged from steel and hardened. All "O.K." motors incorporate our patented cylinder and crankcase construction giving high turbulence with resultant high efficiency.

*All Models on Display at Your Dealers or Order Direct From Us.***HERKIMER TOOL & MODEL WORKS**

Dept. N.

Herkimer, N. Y.

O. K. Special.....\$11.80  
Marine—Inverted, \$1.50 extra.  
Displ. .600 HP—1/5

**ATOM**The Lightest—and Mightiest!  
—production engine model!WILL POWER  
ANY MODEL  
UP TO 32 OZSWEIGHS  
SCANT 2 OUNCES  
WITH PLUG  
& TANK

A sensation! Unique in design, unequalled in performance! Will outclimb; Outpower! Outspeed any engine up to twice its displacement. Your satisfaction is assured by a Money-Back GUARANTEE that the ATOM has the highest "power-to-weight" ratio!

Molybdenum-Chrome Steel Cylinder & Piston, lapped to ONE TEN THOUSANDTH (.0001) OF AN INCH ACCURACY! Instantaneous starting. Radically improved Timing. Snap-On & Off. Transparent Tank. Perfect scavenging at all speeds, assuring tremendous power.

**SPECIFICATIONS:**  
BORE 1/2" STROKE 1/2"  
DISPLACEMENT .051 Cubic in.  
Wt. (incl. Plug & Tank) 2 grams  
R. P. M. .... 250 to 17,500

250  
TO  
17500  
RPM

\$12.50

The ATOM reaches you complete, ready to run, with Coil & Condenser included. Prepaid anywhere in U. S. A.

**COMPLETE BOOKLET:** Contains 15 detailed, scale illustrations—the most thorough of its kind. 5c stamps brings it.

**DISTRIBUTORS—JOBBER—DEALERS:** Write for attractive agency proposition NOW! Orders filled in rotation!

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**Ocean Spanning Razor Blade***(Continued from page 26)*

with consequential increase in load-carrying ability, a higher top speed and higher cruising speed, a slower landing speed and a more stable tendency in even the most strenuous maneuvers.

It took only ten months for Consolidated's forty-two hundred men to build the ship. But it took twice that long for its engineers to design it. We first heard of it as a 100-passenger airliner for Pan American Airways' famous design competition. But now it is not so big. It carries a maximum of 57 persons in twin decks inside the narrow, soup-ladle hull. And it carries them farther and faster than the original model could have. But perhaps this is merely a working model of that giant craft of the future!

The Model 31 is an all-metal design with the exception of cabin interior and fabric-covered control surfaces. It is a twin-engined high-wing cantilever monoplane flying boat and is powered by the most powerful air-cooled radial aircraft engines in the entire world: Wright's own aviation achievement: the Duplex Cyclone, 18 double-row cylinders of TWO THOUSAND horsepower!

The hull is built up on a structure of aluminum frames and stringers with seven water-tight bulkheads. This assembly is covered with aluminum coated aluminum alloy sheet. The hull is of a single step design and approaches a near-perfection in its mathematical exactness of curvature. The undersurface is flush riveted for

**OCTOBER ISSUE  
On Sale Sept. 8th****THE FALCON**

Wingspan 41"

Bare Wt. 7 Oz.

★ **PERFORMANCE** • Weight less motor 7 oz. • Climbs like a rocket • Unexcelled all-round performance • 15 to 1 glide

★ **CONSTRUCTION** • Simplified monocoque • Building time cut 1/2 • Easy accessibility to motor and ignition • Wing slides in event of collision with trees, etc.

Full size detailed plan.

★ **COMPLETE KIT** (less Air Wheels) \$3.25. With M & M 2 1/2" Air Wheels, \$3.75. (Plus 20c postage.)

**MOTORS SHIPPED POSTPAID**

Ohlson "23".....\$16.50  
Synco Bee.....\$12.50  
Busby.....\$12.50  
Ohlson Gold Seal.....\$18.50

Free with each of these motors 1 pt. 70 oil and 1 prop.

Brown B \$21.50, Brown C \$18.50, Brown D \$12.50. Best SAE 70 Oil 35c pint postpaid. Modelcraft props: 11", 14" 25c each. Burd props: 11", 14" 50c each.

Add 10c for post. on props

**FALCON AIRCRAFT**

55 Poplar St.,

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## HURLEMAN CARBURETORS

Metal Tank  
1 1/4 oz. **\$3.50**



Metal Tank  
3/4 oz. **\$3.00**



Glass Tank  
1/4 oz. **\$2.50**

Write for descriptive booklet.  
Please enclose stamps.

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## FREE CATALOG

Listing our GAS MODEL BARGAINS  
Including Supplies, Motors, and Accessories

**RANGER MODEL SUPPLIES**

388-14th Street, Dept. D, Brooklyn, N. Y.

## WOW! WHAT GAS SPECIALS

Nickel Plated Exhausts for Brown Jr. or M. Midget 75c  
Tail Wheel Fork with Sponge Rubber Wheel.....50c  
Aluminum Funnel with Filter.....25c  
Special Bakelite enclosed Coil.....\$1.50  
Super Efficient Gas Props. 9" to 11" 40c 12" to 16" 50c  
Forster Propellers 16"-18" 20" only.....\$1.00  
Austin Flight Timer.....\$1.25  
Toggle Switch.....25c  
Knife Switch, STSP.....15c  
Solderless Booster Jack and Tip, set.....15c  
Champion Plugs 1/4-32 or 3/8-24.....65c  
Brown Spark Plug.....65c  
Hurleman Plug.....75c  
Bunch Coil.....\$1.50  
Smith Fire Cracker.....\$2.50  
Coil.....25c  
Valvoline SAE 70, 1/2 pt. 25c

**The Ohlson "23"**  
Packed full of Speed and power 1/7 Horsepower—5/8 Bore x 3/4 Stroke \$16.50 P.P. Complete

**OTHER ENGINES IN STOCK FOR IMMEDIATE DELIVERY**

Brown Jr. "D"	\$12.50	Mighty Midget	\$ 9.50
Brown Jr. "C"	18.50	Mighty Midget Kit	7.85
Brown Jr. "B"	21.50	Gwin	12.00
Herkimer Special	11.80	Gwin Kit	9.95
Herkimer Deluxe	21.00	Sincro Special	9.95
Denny Deluxe	17.85	Sincro Ace	13.75
Denny Standard	15.85	Sincro Ace	12.50
Denny Unit	13.85	Hi-Speed	12.75
Forster	17.75	M & M 292	16.50
Forster Ball B.	19.50	New "Husky" JV	12.50

We can give immediate delivery on all Gas Kits advertised by Megow, Comet, Scientific, Berkeley, Ideal, Peerless, Cleveland, Aircraft.

Midwestern Gas Model Headquarters  
**TROST Model Airplane Shop**  
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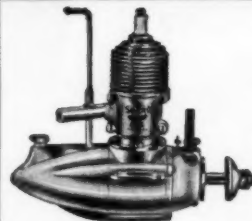
smoothness. Within the nose section is the anchor, mooring and stowage compartment. Along the upper deck is the main command cabin with the pilot and co-pilot seated high atop the hull. Immediately behind them are the ship engineer and the communications men (a radio operator and a navigator); five men whose fingers control the pulse of the giant airliner.

When the first production model is completed there will be seats for 52 passengers for day operations and luxurious sleeping accommodations for 28 persons for transoceanic flights. At present the hull is a jumbled mass of engineering testing mechanisms. The upper and lower decks are strapped with weighted bags which are added and removed, changed and shifted for testing. Fuel analyzers, weight and balance machines, vibration, stress and strain testing apparatus, magnetic measuring instruments, noise locators and analyzers, all are doing their job every hour that Chief Test Pilot Bill Wheatley has the giant ship in the air. When those tests are completed, that maze of data recorders will make way for one of two things: luxurious passenger accommodations or heavy-duty machine-guns, bomb and torpedo placements; no one at this date knows which. For the Model 31 Flying Boat has tremendous possibilities as a long-range fast-flying naval torpedo boat and patrol bomber and officials of the naval patrol-bomber base across the bay at North Island Naval Air Station have poked their noses inside this craft and sniffed pleasingly.

This new model bears little family resemblance to other Consolidated models, differing chiefly in its rearrangement of retracting wing-tip floats. The thin, razor-sharp wing was too narrow at the tips to accommodate Consolidated's famous floats and the Model 31 now swings them inboard and up into the wing where only their lower surfaces protrude. The wing is all-metal cantilever and flush riveted throughout. It is built up in three sections—two outer panels and the center section which mounts the engines and houses the big integral fuel tanks. The giant engines are mounted high and close inboard in the wing and are incased in small egg-shaped nacelles. But those dumpy nacelles, elliptical in section, have something a more symmetrical, flowing streamlining does not have; for the Model 31 was several hundred hours in the wind tunnel at Caltech's Guggenheim Foundation before construction was ever started. The nose cowlings are equipped with engine cooling flaps and each engine is equipped with a retractable working platform. Within the nose of each engine is the powerful gear which controls the huge Hamilton Standard hydromatic full-feathering propellers of sixteen feet diameter.

The twin elliptical rudders are slung high on the end of the cantilever stabilizer at the top rear point of the soup-ladle handle tail boom. These are statically and aerodynamically balanced through the use of heavily weighted construction forward of the hinge line. The fixed surfaces are flush riveted, the movable surfaces fabric-covered and equipped with trimming tabs. The pilots' controls to these surfaces are boosted up with an electrical drive which lessens the fatigue of long-range flying.

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A novel feature of the Model 31 is the introduction of aviation's first retractable beaching gear of tricycle design. The two rear wheels are mounted aft of the center of gravity and swing upward and inward into openings to the rear which are sealed by retracting metal plates. The nose wheel slides up and down in a keel opening which is also covered by retractable panels. Although not intended for an amphibian, an emergency landing could be made on this gear in the event of power failure over dry land.

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hatch on the lower deck on the port side of the ship. Stairs lead to the upper deck and the eight main cabins and there are no impediments to mar the uniformity of them.

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The Consolidated Model 31 Flying Boat has a length of 73 feet overall and is 22 feet high. Its amazing wing has a span of 110 feet and is only 14 feet at the root chord, its maximum width. Gross weight is near the fifty thousand pounds mark, which gives the craft a power loading of only twelve and one-half pounds per horsepower, less than its smaller brother, the PBV Bomber.

Performance figures are not as yet official but according to Bill Wheatley the big ship hit a top speed of better than 275 miles per hour at less than full throttle on its first test flight and cruised at 240 miles per hour. It lands at little more than 70 miles per hour and all present tests indicate a cruising range of better than ten thousand miles (about THREE TIMES that of Boeing's big Yankee Clipper!)

What are the plans for this new and startling ship? Well, the navy is definitely interested in the craft and wants large

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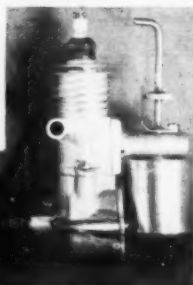


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## Fundamentals of Model Plane Design

(Continued from page 13)

Now that we know all the factors that are required for the successful operation of an airplane, it is necessary to determine what mechanical means should be used in order to have a plane function in accord with the requirements of these factors.

An airplane is a complete assembly of all these required mechanical means placed in correct relation to one another. When they are assembled in their correct relative positions, according to the dictates of past experience, the resultant combination will appear as in Fig 1, a full-fledged airplane. The figure shows a typical model plane. The parts that compose the structure and the functions they perform are as follows:

The wings serve as a means of lift; the propeller acts as a means of propulsion; a small "gas" engine is the source of power; the tail surfaces as well as the correct form and relative position of other surfaces and weights serve to provide stability; the wheels and their supporting struts act as a landing gear; and the fuselage serves as the structure which holds together in their correct relative positions all the units which function as a requirement of flight. Control of such a plane is attained by setting the tail, wings and propeller at definite angles to one another and in certain positions relative to the center of weight of the airplane.

A device may have all the required structural factors, such as wings, tail surfaces, propeller, engine, etc., yet it may be incapable of flight. This is the enigma which baffles many would-be model builders. Usually the beginner starts his model plane adventure by copying the proportions of a full scale airplane. Nothing could contribute more to failure than such a procedure. The model builder observes the characteristics of the plane that may be seen with the eye, but disregards the intangible unseen factors; such as centers of weight, angles of the surfaces and distribution of structural weights. These are

extremely important and must have very definite values in every particular airplane. The size of a plane has an influence on the value of these intangible factors even though the smaller model may be a duplicate of the full scale ship in all visible aspects. Thus a small model of a full scale craft may not fly as expected and perhaps not at all.

In other words the flight capacity of a plane depends upon the relative size, shape and position of the parts of which it is composed.

Obviously therefore if the model designer understands how to proportion his plane correctly he will be able to design models that will fly properly.

The correct basic proportions of a flying model plane may be established by the application of a few simple rules. Figure 2 shows a diagram of a typical model plane on which is indicated the correct proportions of its various parts. If a model builder constructs his plane according to these proportions his plane will operate satisfactorily. The rules of proportion given are purely basic. In order to design various types of planes it is necessary to be able to apply more specific rules which govern the detailed characteristics of the parts that function to fulfill the requirements of flight.

In the following pages therefore, rules of design governing the wings, the propeller, the power unit, stability, the landing gear and the control of the plane will be given and discussed in detail.

### The Wings—How Lift Is Generated

Everyone takes it for granted that a wing will lift when used in the customary manner. However, possibly few of us have stopped to think why a mechanical means of this nature should give such results. It isn't the purpose to go into great detail at this point; however a general idea of the action of the air on any moving wing surface should be understood in order to know how it will apply to special rules of design.

The lift of any moving surface may be demonstrated in a very simple manner:



Just hold a piece of cardboard in your hand in an extended fashion and move it through the air with the forward edge raised slightly. The air will create pressure on this cardboard strip in an upward direction and slightly backward. The person holding the cardboard can feel the lift very readily if it is moving through the air at a reasonable speed.

The lift is produced by infinitesimally small air particles passing over and under the surfaces of the cardboard. Inasmuch as these particles have mass or weight, they tend to keep moving in a straight line. As soon as they strike the cardboard they are deflected. However, they resist this imposed change of motion and press tightly against the under surface of the cardboard.

Not being able to pass through this surface they are deflected downward. The reaction of this is a pressure on the cardboard upward and backward. This, in effect, is lift and drag. Unfortunately there is always a little resistance caused by a wing when lift is generated by it. This is the price that must be paid when the desired effect is obtained.

However, this is not all of the story. The lift of which we have been speaking is generated by the effect of the air striking the under surface of the wing. On the other hand about three times as much lift as this is generated by the vacuum which is created by the moving air over the wing. Normal air pressure at sea level is 14.7 pounds per square inch. Now, if the pressure on the top surface of the wing can be reduced, a suction, so-called, will be created. The difference between this reduction of pressure on the upper surface and the increase in pressure on the lower surface of the wing amounts to the total lift generated by it.

Diagram 3 gives a graphical picture of the airflow over a flat surface, AB. It can be seen that the air which strikes the under side of the wing, at P, is deflected. The air passing over the wing tends to keep moving in a straight line. Inasmuch as the rear of the wing is deflected, such an action causes the air to pull away slightly from the upper surface of AB, thus causing a partial vacuum. Actually the air is not pulled entirely away but curls downward, as shown by the lines over it, AB. If AB is inclined at a very small angle the lines of airflow over the wing will be fairly smooth. However if the wing is inclined at a higher angle, as shown in the figure, whirls of air will occur close to the upper surface. At this point the lift begins to drop and the resistance to forward motion increases considerably. It is a critical angle of flight and is often called the "stalling angle."

The air pressure and suction upon the wing in flight produces a force on the wing acting perpendicular to it. Inasmuch as the wing is at a positive angle in flight this force will be inclined slightly backward.

In figure 4 the resultant force on the wing, XY, is shown at A. This may be divided into two forces; a vertical force, L, and horizontal force, D. These components of force A in effect are: Lift, (L) and Drag, (D).

If the length of line A in the diagram represents the actual amount of force generated by the wing, XY, then the length of the line, L, will represent the amount of

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lift generated by the wing and the length of line, D, will represent the amount of drag.

### Curved Wing Surfaces (Cambered)

So far we have been discussing flat surfaces or wings. Early experiments disclosed the fact that greater lift and less drag could be obtained by curving the surfaces slightly, as shown in Fig 5. XY represents a curved wing, such as might be created by a curved sheet of cardboard or balsa wood. Curving the wing in this manner has the effect of inducing a smoother airflow over its surface. Under any conditions if the air can be made to flow smoothly over a wing, more lift and less drag will result. Thus we can see that a wing, such as shown in XY, will be more efficient than a flat surface.

As in the case of a flat wing, there is pressure on the under side of the curved surface and a vacuum generated over the upper surface of the wing. The vacuum is indicated by the shaded portion at V. The lines with the arrowheads indicate how the air flows over this curved surface. You will note that the curved-down nose or leading edge of the wing induces an upward slant to the airflow over it. This upward flow tends to bounce the air particles away from the upper surface of the wing.

On the other hand the wing curves gradually away from the airflow. Thus you might say that the air tends to pull away from the upper surface of the wing and the wing tends to curve away from the airflow. This induces a partial vacuum or suction. Inasmuch as there is no abrupt change in the airflow produced by the wing, it flows smoothly over this surface.

### Position of Maximum Camber

Though a curved wing surface is more efficient than a flat wing, the character of the curve used on the wing has a great deal to do with its lift and efficiency. The arc of a circle; that is, a perfectly regular curve, can be used. This gives fairly good results. However from experiment it has been determined that the best results are obtained when the maximum height of the curve, measured from a straight line drawn from the leading and trailing edges of the wing, should be approximately 1/3 of the distance from the leading to the trailing edge, back of the leading edge.

This is shown graphically in Figure 6. In the figure, XY is the curved wing surface. The distance from X to Y is called the "chord" of the wing, as indicated on the diagram. The dotted line, XY, is the chord line. The maximum height of the curve should be approximately at the point shown by the arrow C. Thus the maximum curve height is 1/3 of the chord length from the leading edge, X. Wings which have this type of curved surface will give greater efficiency than any other type of single surface wing.

This term, "single surface," causes one to suspect that there are other features about a wing which are important in the creation of lift. These will be discussed in the next article of this series, together with other important facts.



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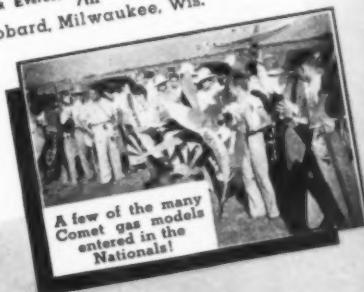
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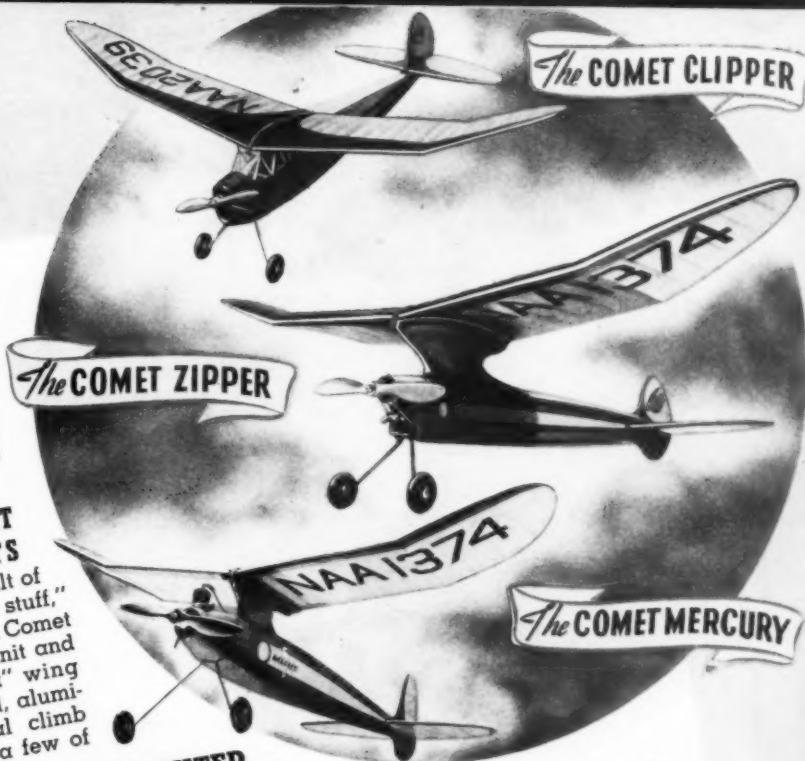
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